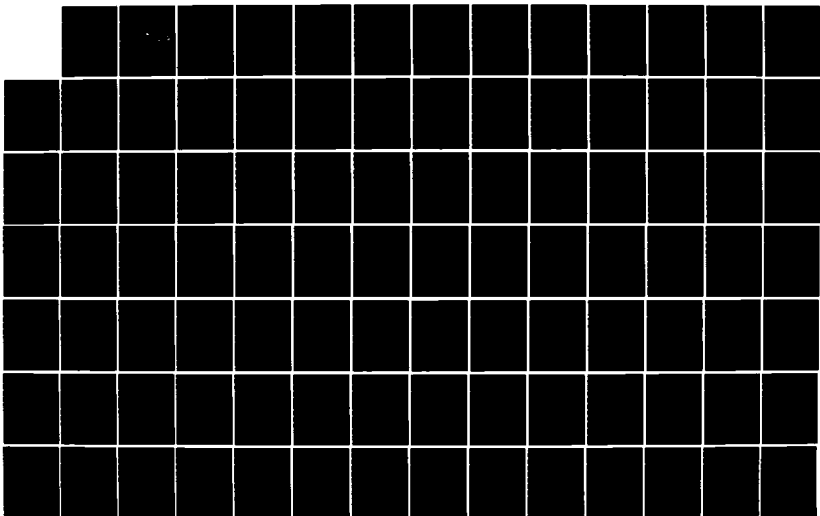


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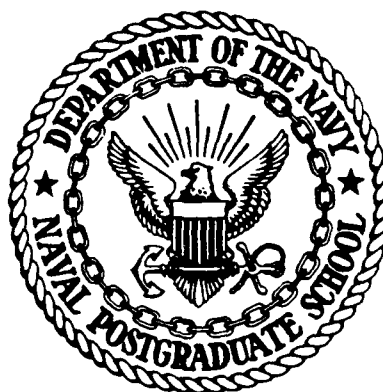
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THESIS

A COMPARISON OF THE SHIP SYSTEM ACQUISITION
PROCESS OF THE GREEK NAVY AND US NAVY.

by

Petros F. Lemonidis

December 1984

Thesis Advisor:

Jeffrey E. Ferris

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1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) A Comparison of the Ship System Acquisition Process of the Greek Navy and US Navy.		5. TYPE OF REPORT & PERIOD COVERED Master's Thesis; December 1984
7. AUTHOR(s) Petros F. Lemonidis		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS Naval Postgraduate School Monterey, California 93943		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS Naval Postgraduate School Monterey, California 93943		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE December 1984
		13. NUMBER OF PAGES 142
		15. SECURITY CLASS. (of this report) UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution is unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report) Approved for public release; distribution is unlimited.		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Acquisition Process, Major Weapon Systems, Milestones, Cost, Program Manager, Contracting Officer, Conceptual Effort, Mission Need Determination, Demonstration and Validation Phase, Full Scale Development, Production and Deployment		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The above thesis is an attempt to improve the existing policy and procedures for acquiring major weapon systems by the Greek Navy. This thesis focuses on existing procedures in the U.S. Navy and similar policies followed by the Greek Navy. In compiling this study, the author attempts to include an analysis of the constraints faced by the Greek Navy, such as the lack of an adequate industrial base to construct major		

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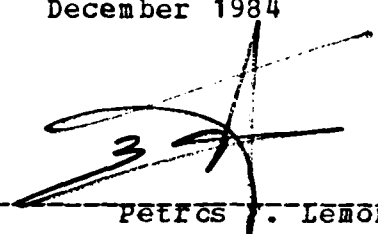
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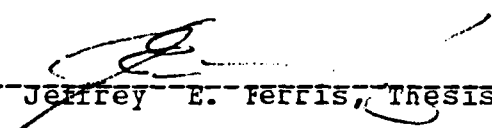
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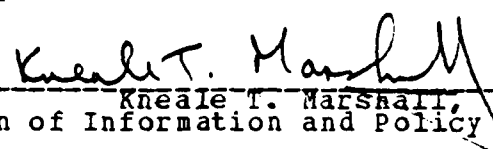

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ABSTRACT

The above thesis is an attempt to improve the existing policy and procedures for acquiring major weapon systems by the Greek Navy.

This thesis focuses on existing procedures in the U.S. Navy and similar policies followed by the Greek Navy. In compiling this study, the author attempts to include an analysis of the constraints faced by the Greek Navy, such as the lack of an adequate industrial base to construct major weapon systems, although the necessary scientific personnel are available.

The entire policy/plan is based on a comparison between the two examined procedures, noting their similarities and differences.

Existing procedures

ACKNOWLEDGMENTS

At the completion of this research the author initially wishes to express his gratitude as well as his personal sincere appreciation to LCDR Jeffrey E. Ferris SC USN and to Professor Dan C. Boger for their attentive assistance in all phases of this work.

Furthermore, I would like to express my sincere contentment to:

- My wife Katerina who always encouraged and helped me during my efforts for education and continuous self improvement, and to whom I dedicate this thesis.
- Admiral Theodoros Manolopoulos for cooperation and support in all problems that appeared during this work, especially for the procedures followed by the Greek Navy, and through which I was able to understand a portion of his vast knowledge and experience.
- Professor Gerard Hoffmann, Captains R. Gardenier and W. Krieg U.S.N, civilians Messr Doug Samples, Fred Haub, and Fred Beer for their interviews, during my visit in NAVSEA.
- Commanders X. Tsirkas and I. Mpouloukos of the Greek Embassy in Washington D.C., for the information I got and the supporting documents.

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and 1.4 percent, and the National Expenditures between 0.4 and 1.4 percent [Ref. 28].

The Greek economy had rapid growth until fiscal year 1973. At that time an economic crisis happened that lasted one year. During the following four years, from 1975 to 1979, economic growth continued but the rate at which it was growing was characterized by a stable small pace until 1981.

Precisely, the unemployment rate for the year 1983 was 9.0, for 1982 7.2, and for 1981 5.5 percent. Inflation remains at an unusual high rate. A 20 percent rate is higher than that commonly existing in European Countries. The capital inflow and the non-capital receipts (foreign travel, transportation, unrequired transfers, interests, dividends, profits, official services, miscellaneous services) for the years 1980 through 1982 were \$9,145.70m, 12,383.90m and 11,872m correspondingly. On the other hand the capital outflow plus the invisible payments were \$2,240.90m, 5,839.50m and 6,362.10m correspondingly [Ref. 29].

Figure 2.1 shows the developments in liquid assets during the years 1981-82-83, from which the result is that from January 1981 to December 1983 the savings deposits increased by 118 percent. [Ref. 30].

Figure 2.2 shows the total credit to the economy by sector of economic activity. On the vertical axis the money is measured in billions of drachmae and on the horizontal axis the months and the years are measured. The manufacturing industry had an increase in credit of 92.70 percent. From this figure it also can be seen at what level the country credits the manufacturing activity.

1. Incentives

Incentives to support the country's regional and economic development and amendment of provisions incidental thereto are established in the Law 1262 of the Greek

II. GREECE AND ITS ECONOMY

Greece is a small country located in the southeast corner of Europe and has an ancient civilization of more than 4,000 years. Many strategic and political changes have been made during its long history.

The country occupies a path that connects three continents (Europe-Asia-Africa). The countries sharing boundaries with Greece have different social and economic systems. On the northern boundary there are Yugoslavia, Bulgaria and Albania, and to the east there is Turkey. The other sides are surrounded by the Mediterranean Sea.

Some numerical data are listed below:

- Population: 9,740,417 (census 1981),
- Area: 131,990 sq. km.
- Islands: 202.
- Rock-islands: 2,898.
- Length of coasts: 15,021 km.

Greece became a member of the NATO Alliance in October 1951, after 5 years of occupation by the Germans and 4 years of civil war.

A. ECONOMIC CONDITION

The Gross Domestic Product (GDP) per capita for the year 1983 was estimated to be \$3,752 and the defense expenditures as a percentage of GDP in purchases values for the year 1983, were estimated to be 7.1 percent [Ref. 1].

The increase in the Gross National Product of Greece is predicted to fluctuate between 0.4 and 1.3 percent in 1984. The Gross National Income prediction fluctuates between 0.0 and 1.0 percent, the available National Sources between 0.4

The ninth chapter covers the proposed policy/plan for the Greek Navy as far as the acquisition process.

Finally, in the last chapter conclusions and recommendations have been included.

From the above discussion the problem becomes apparent. It consists of two parts.

The first is the lack of an established industrial base for domestic procurement of major systems for the DOD and especially for the Navy. This problem exists despite the fact that scientific personnel have the necessary technical knowledge to support the required industrial base.

The second is that the country is forced to suffer large defense expenditures which do not benefit the domestic economy. These defense expenditures go to foreign countries instead of going to domestic industry. In addition, there is a dependence on foreign industry to support the national defense.

D. SCOPE OF THE THESIS

This thesis will address the above two problems confronting Greece. An attempt will be made to develop a proposed policy/plan for the acquisition process that could be used by the Greek Navy.

The second chapter indicates data for the Greece and its Economy.

The third chapter describes the Greek DOD and Navy.

In the fourth chapter a description is given for the procedures of the acquisition process used by the U.S. Navy.

The fifth chapter analyses the system management and its cost.

The sixth chapter describes all the procedures that are used by the Greek Navy for the purpose of acquiring major weapon systems.

The seventh chapter analyses the contracting procedures in the Greek Navy.

The eighth chapter presents similarities and differences between the U.S. Navy and the Greek Navy for the acquisition process to be described.

Country	Military only (thousands)						Total armed forces (b) as % of total labour force					
	1978	1979	1980	1981	1982	1983*	1978	1979	1980	1981	1982	1983*
(a)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Belgium	103	107	109	103	110	103	29	28	28	28	28	27
Denmark	33	33	33	33	30	32	16	17	16	16	15	15
France (a)	591	578	575	575	577	578	31	31	31	31	31	31
Germany	431	492	490	493	490	495	25	25	25	24	24	24
Greece	106	187	186	187	188	186	65	64	61	58	58	57
Italy	483	491	500	505	517	498	25	24	24	24	25	24
Luxembourg	1	1	1	1	1	1	09	08	08	08	08	09
Netherlands	106	107	107	108	105	104	26	26	25	25	24	24
Norway	40	40	40	39	41	40	27	26	26	25	26	25
Portugal	82	81	89	89	89	90	22	22	23	23	22	22
Turkey	721	698	717	741	769	824	45	43	44	44	44	46
United Kingdom	370	374	379	341	334	332	22	22	22	22	21	21
NATO Europe	3 171	3 133	3 175	3 220	3 262	3 203	29	29	28	28	28	28
Canada	79	79	82	81	82	82	11	11	10	10	10	10
United States	2 031	2 050	2 101	2 160	2 205	2 263	29	28	29	29	29	29
Total NATO	5 271	5 268	5 358	5 463	5 540	5 624	28	28	28	28	28	28

Figure 1.4 Armed Forces

Finally, in figure 1.4 it can be seen that Greece is first among the NATO countries as far as the total armed forces as a percentage of total labor force, with a proportion of 5.7 and an average of 6.05 for the years 1978 through 1983.

Country	Gross Domestic Product per Head						Defence Expenditures per Head					
	1978	1979	1980	1981	1982	1983e	1978	1979	1980	1981	1982	1983e
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Belgium	9 571	9 795	10 062	9 883	9 981	9 877	328	335	341	344	332	322
Denmark	11 071	11 449	11 344	11 369	11 730	11 941	277	277	279	281	280	279
France	10 243	10 543	10 610	10 591	10 651	10 566	407b	416b	428b	442b	444b	447b
Germany	10 494	10 926	11 088	11 076	10 978	11 073	363c	368c	375c	386c	383c	392c
Greece	3 724	3 815	3 840	3 790	3 766	3 752	250	240	218	265	264	265
Ireland	11 920	12 248	12 638	12 782	12 366	11 428	—	—	—	—	—	—
Italy	5 727	5 990	6 211	6 198	6 208	6 096	144	148	155	154	158	159
Luxembourg	10 217	10 583	10 767	10 621	10 529	10 371	101	104	121	126	131	136
Netherlands	9 916	10 083	10 087	9 938	9 738	9 762	308	319	310	318	323	331
Norway	12 825	13 432	13 967	13 962	13 826	13 837	382	388	393	402	417	429
Portugal	2 174	2 307	2 407	2 439	2 497	2 450	76	80	84	85	85	84
Turkey	1 313	1 273	1 236	1 261	1 290	1 308	62	62	62	62	63	62
United Kingdom	9 202	9 344	9 152	8 967	9 077	9 256	412	420	432	440	462	480
NATO Europe	7 710	7 922	7 964	7 896	7 890	7 881	283	288	293	300	304	300
Canada	11 208	11 453	11 368	11 668	10 991	11 083	209	205	210	215	222	210
United States	12 507	12 660	12 477	12 644	12 311	12 561	670	687	708	739	791	862
Total NATO	9 734	9 932	9 886	9 931	9 772	9 876	432	442	454	470	494	526

Figure 1.3 Gross Domestic Product

In figure 1.3 it is shown that the Greeks pay \$265/year/head for defense expenditures.

Country	Currency Unit (Million)	Actual														Forecast	
		1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
Belgium	Belgian Franc	8 271	20 707	50 531	57 739	70 829	81 444	87 480	94 126	104 422	115 754	125 689	132 127	137 161	142 195	147 229	152 263
Canada	Canadian \$	372	1 771	2 405	2 862	3 127	3 509	4 124	4 662	5 100	5 429	5 789	6 163	6 547	6 931	7 315	7 699
Denmark	Danish Kroner	360	885	3 520	4 439	5 281	6 199	7 379	8 515	9 649	10 783	11 917	13 051	14 185	15 319	16 453	17 587
France (a)	Francs	4 787	11 710	42 284	47 878	55 852	63 899	73 779	83 659	93 539	103 419	113 299	123 179	133 059	142 939	152 819	162 699
Germany (b)	DM	6 282	31 998	31 998	35 644	37 580	39 516	41 452	43 388	45 324	47 260	49 196	51 132	53 068	55 004	56 940	58 876
Italy	Lira	1 630	3 428	10 991	31 499	45 916	55 963	67 778	77 861	87 944	98 027	108 110	118 193	128 276	138 359	148 442	158 525
Netherlands	Guilder	301	543	2 392	2 852	3 104	3 608	4 531	5 301	6 174	7 047	7 920	8 793	9 666	10 539	11 412	12 285
Norway	Norwegian Krone	112	565	691	710	836	961	1 079	1 197	1 315	1 433	1 551	1 669	1 787	1 905	2 023	2 141
Portugal	Escudo	680	1 581	5 260	6 144	7 119	7 662	9 002	9 146	10 486	11 826	13 166	14 506	15 846	17 186	18 526	19 866
Spain	Peseta	370	1 141	3 505	3 928	4 771	5 313	5 934	6 854	7 362	8 242	9 468	10 956	12 078	13 199	14 321	15 443
Turkey	Lira	1 419	2 100	16 736	25 108	19 818	18 845	22 082	27 354	34 343	43 440	51 917	63 817	79 021	94 225	109 429	124 633
United Kingdom	£ Sterling	566	934	12 192	15 811	30 290	40 691	49 700	55 239	61 778	68 317	74 856	81 395	87 934	94 473	101 012	107 551
United States	US \$	779	1 569	3 512	4 160	5 165	6 132	6 810	7 616	8 422	9 228	10 034	10 840	11 646	12 452	13 258	14 064
West Germany	DM	13 503	42 786	78 358	85 206	90 948	91 013	100 925	102 247	112 279	122 311	132 343	142 375	152 407	162 439	172 471	182 503
Yugoslavia	Dinar	4 818	11 756	40 781	46 244	55 474	55 905	62 927	76 677	92 196	107 621	123 046	138 471	153 896	169 321	184 746	200 171
Other Europe	US \$	13 875	44 607	80 762	88 832	94 023	94 653	104 802	113 334	125 394	137 454	149 514	161 574	173 634	185 694	197 754	209 814
NATO (c)	US \$	18 713	56 363	121 543	135 076	149 457	150 558	167 729	190 011	218 594	256 305	294 016	331 727	369 438	407 149	444 860	482 571

Figure 1.2 Total Defense Expenditures of NATO Countries

Country	Average 1973-1977	1978	1979	1980	1981	1982	1983*
(0)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Belgium	3.0	3.3	3.3	3.3	3.5	3.4	3.4
Denmark	2.3	2.3	2.3	2.4	2.5	2.5	...
France (a)	3.8	4.0	3.9	4.0	4.2	4.2	4.2
Germany (b)	3.5	3.3	3.3	3.3	3.4	3.4	3.4
Greece	6.3	6.7	6.3	5.7	7.0	7.0	7.1
Italy	2.5	2.4	2.4	2.4	2.5	2.6	2.8
Luxembourg	0.9	1.0	1.0	1.1	1.2	1.3	1.3
Netherlands	3.1	3.1	3.2	3.1	3.2	3.2	3.3
Norway	3.1	3.2	3.1	2.9	2.9	3.0	3.1
Portugal	4.9	3.5	3.5	3.5	3.5	3.4	3.4
Turkey	5.4	5.2	4.3	4.3	4.9	5.2	4.9
United Kingdom	4.9	4.6	4.7	5.1	4.9	5.1	5.6
NATO Europe	3.7	3.6	3.6	3.7	3.8	3.8	...
Canada	1.9	2.0	1.8	1.8	1.8	2.1	2.1
United States	5.7	5.1	5.1	5.5	5.8	6.5	6.9
Total NATO	4.6	4.2	4.2	4.4	4.7	5.1	...

Figure 1.1 Defense Expenditures as Percentage of GDP

The major problem in obtaining a larger share of the defense dollar for Greek industry is the lack of the appropriate industrial base of acquiring major weapon systems, in comparison with the U.S. industrial base that the U.S. Navy uses for the same purpose.

This is one side of the coin. The other is that Greece spends a lot of money every year on defense requirements. Figure 1.1 contains numerical data that show these data. Greece spends a greater proportion of its GDP for defense than any other country in the NATO Alliance. It also has to be mentioned that the figures shown for European NATO countries do not include the value of end-items received under military aid programs from the United States and Canada [Ref. 1].

Figure 1.2 shows the total defense expenditures of NATO countries since 1949. Greece had the third highest expenditures in 1983, after Turkey and the US.

the various phases that take place in the acquisition cycle. A discussion of the major program milestones, Life Cycle Cost (LCC) and the role of the program manager will be included. Specific details below the level of the US Department of Defense will not be analyzed, since the organizational structures and procedures vary among the military services.

The second step is a review of the existing acquisition procedures in the Greek DOD. These procedures will be described in the same way as the U.S ones.

In order to obtain first-hand information about the acquisition process, the author, in addition to a literature review, conducted personal interviews with officers and civilians working in the NAVAL SEA SYSTEMS COMMAND (NAVSEA) and in the GREEK EMBASSY. The discussions included topics that affect the acquisition process in the Navy, and the specific duties and responsibilities of the program/project manager.

C. STATEMENT OF THE PROBLEM

In past years the capabilities of Greek industry were limited to ship repairs, the construction of some minor weapon systems, or the installation of systems which were bought from the US or other countries (France, Norway, Belgium, W.Germany, Netherlands). The cost of the procurements, installations and alterations was high because of the higher GNP, personal income, and wage rates of these countries. Likewise, the profit level was higher for foreign industries than it would have been for the domestic industries. Since 1978, Fast Patrol Boats (FPBs) based on French designs have been constructed in Greek Shipyards. These FPBs remain in good operational condition, even though these were the first constructed by Greek technicians.

I. INTRODUCTION

A. THE PROBLEM

A major problem, among others, that is confronted by many countries all over the world is that of acquiring major weapon systems. Some of them confront the problem from the contractor's viewpoint, whose position is affirmative at first but later on it may change due to unpredictable reasons. Some others are faced with the main problem of how to allocate their limited resources, relative to the programs associated with the defense needs. A third problem may arise from the lack of the necessary industrial facilities to construct such systems. Finally other countries have to solve the problem of the variety of the procedures that are going to be implemented, since they have to rely upon the contractor's rules and procedures, of building a major system.

Greece is included among the above discussed countries. Along with a growing economy, it has to incur large expenditures for defense. The country is faced with the problem of the domestic and foreign acquisition of major systems. It has to take into account the lack of an industrial base and therefore rely upon the foreign industry.

B. OBJECTIVES OF RESEARCH

The objective of this research is to develop a series of recommended policies and procedures for improving the acquisition process of the Greek Navy.

The first step is a review of the procedures that are currently used by the U.S. Department of Defense (DOD) in acquiring a major weapon system. This review will include

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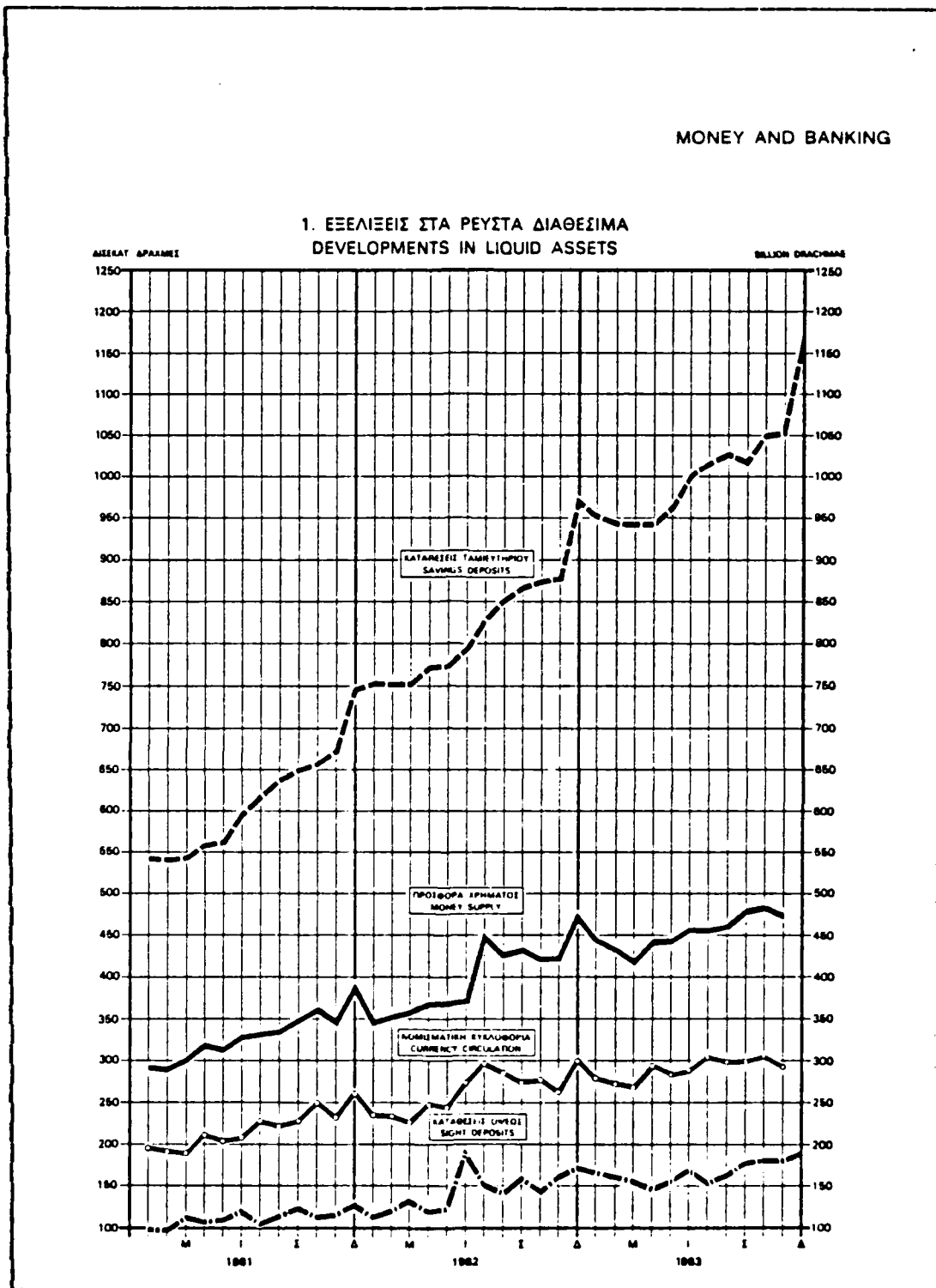
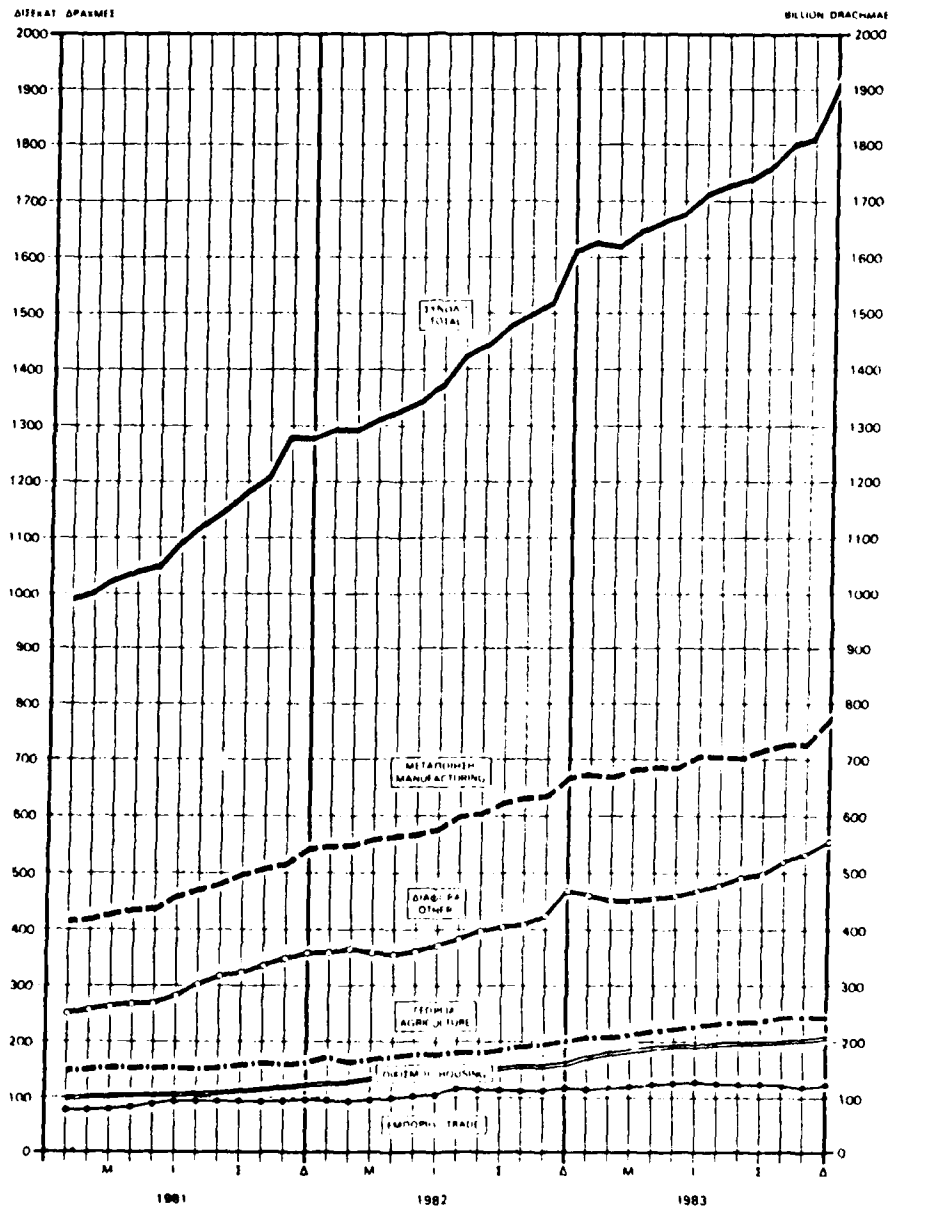


Figure 2.1 Liquid Assets

3. ΣΥΝΟΛΙΚΗ ΧΡΗΜΑΤΟΔΟΤΗΣΗ ΤΗΣ ΟΙΚΟΝΟΜΙΑΣ ΚΑΤΑ ΚΛΑΔΟΥΣ
 TOTAL CREDIT TO THE ECONOMY BY SECTOR OF ECONOMIC ACTIVITY



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Figure 2.2 Total Credit to the Economy

legislation as amended and supplemented by the Law 1360/1983 [Ref. 31].

These two laws state that productive investment is defined as the purchase of new machinery and other mechanical or technical production equipment and the purchase of new electronic computers and other data-processing or automation systems.

In the above category are also included the cost of investment in the importation, development and application of modern technology, the cost of installation of a model test unit, and the investment costs for applied research and purchase of laboratory instruments or equipment for applied research in industry or mining.

Finally the productive investment is applied in moving expenses for the relocation of existing productive units to less-developed areas or within the same area but in an industrial or handicraft zone.

The business enterprises included for the purpose of acquiring the privileges of the existing legislation are farming, mining, technical aid centers, manufacturing and others providing services.

B. COUNTRY'S AREAS FOR INVESTMENTS

To promote regional development and economic decentralization, the territory of Greece is divided into four wide development areas. Each of these areas includes provinces and districts. Since about 50 percent of the Greek population lives in the capital and the surrounding suburbs, the government established incentives trying to encourage industry to locate their activities in different regions rather than concentrating near Athens.

1. The Four Areas

Among the four areas (A,B,C and D) in which the country has established incentives, emphasis is placed on area D which is located near the Northern borders of Greece and in some islands. For the purpose of promoting private investments, the following grants are made available by the State, in the form of capital aid:

- For investments up to 400M drachmae the grant is given free to cover part of the investment cost.
- For investments from 400M to 600M drachmae inclusive and for the amount exceeding 400M drachmae, 50 percent of the grant is given free to cover part of the investment cost and 50 percent in the form of public participation in the capital of the company, which is either a private limited company (LLC) or a public limited company (SA).
- For investments over 600M drachmae the grant is entirely in the form of public participation in the capital of the investing company.

Enterprises are required to accept public participation and have the option of qualifying for the benefits of this law. This situation takes place only for part of the investment up to 400M drachmae or, when they accept public participation by 50 percent, for part of the investment from 400 to 600M, keeping however a minimum of private participation in the total investment. The above mentioned amounts may be readjusted by decision of the Minister of National Economy, published in the Government Gazette. To determine the limit of 400 million drachmae, the total level of the investment program will be taken into consideration.

In table 1 the grant and own participation rates are included. This table indicates the four areas in which the country is separated for matters pertaining to investments

and grants for the purpose of encouraging the manufacturers to locate their activities in the regional areas.

TABLE 1
Grant and Own Participation Rates

Area	Grant up to 30% (only for special investments)	Own participation (minimum) 30% (only for special investments)
A		
B	10% to 25%	35%
C	15% to 40%	25%
D	20% to 50%	15%
	35% to 50% (only in the special zones)	

Special zones presenting an acute development problem in relation to the rest of the area may be designated in each subsidized area by Ministerial Decision. On the other side certain investments that are of particular concern to the Greek economy are classified under the category of special investments, and include, among others, the production of goods and services of highly advanced technology. In addition, these investments include the establishment or extension of laboratories for applied industrial, mining, and other research.

To fix the total level of the investment program, the aggregate of all investment programs referring to the same production process will be examined. This level will be fixed if these programs are submitted by the same investor for qualification for the benefits of the provisions of this law. The qualification must be submitted within a period of

up to 5 years from the completion of the investment. This refers to the same production process and has already been submitted to the provisions of the law 1262/1982.

III. STRUCTURE OF THE GREEK DOD AND NAVY

A. FORMAL STRUCTURE OF THE GREEK DOD

The Greek DOD operates under law 660/1977, that is based upon article #45 of the country's constitution of 1975. This law specifies the structure of YETHA (Ministry of National Defense), GEETHA (General Staff of National Defense) and of the three military branches, GES (General Staff of Army), GEN (General Staff of Navy) and GEA (General Staff of Air Force).

The command of the above branches [Ref. 15], rests upon basic principles established by the French manufacturer HENRI FAYOL in 1916. These principles are:

- Labor division
- Authority and Responsibility
- Discipline
- Chain of Command
- Unity of Command
- Initiative
- Common sense

According to this article of the Greece's constitution "The President of the Republic commands the Armed Forces of the Country through the Government, which approves and assigns ranks to military perscnel, of all the services".

Law 660/1977 states that the responsibility for the National Defense (ND) rests upon the Government, which establishes the general policies and their implementation.

For the purpose of carrying out all of its defense duties, the Government is assisted by the KYSEA, named the "Governmental Council of National Defense".

B. GOVERNMENTAL COUNCIL OF NATIONAL DEFENSE (KYSEA)

The Council has the following duties:

- Makes all the decisions pertaining to ND
- Forms ND policies
- Introduces to the President of the Republic the declaration or raising of the state of general mobilization and the proclamation of war
- Determines the declaration or raising of the alert and also the country's mobilization
- Appoints the Chief of GEETHA (A/GEETHA), and the Chiefs of the other military branches and the Corps of National Security
- Selects the Army Commanders, the Chief of the Tactical Air Force and the Vice Generals of GEETHA

All of KYSEA's decisions are sent to the Defence Minister (DEM), and also to other ministries as applicable. The Ministries have the responsibility for implementing the rules established by the KYSEA, by issuing detailed procedures. In some cases ministries may suggest proposed changes to the law, for the purpose of implementing their policies.

The DEM similar to the Secretary of Defence (SECDEF) of US, is responsible to the Government for the command and control of the ND, for the purpose of establishing in this field all the procedures and rules that are expressed by the Parliament. Also, he is the supervisor of each branch of the ND, assisted in his duties by the Chiefs of GES, GEN, GEA and finally by the Chief of GEETHA (A/GEETHA) in cases requiring their coordination. In addition to the control and coordination of ND the DEM carries out other duties such as:

- Planning the Public National Defense and establishing requirements for development programs for the benefit of ND

- Organizing the structure, policies and procedures of ND
 - Managing decisions that affect generally topics in the ND area
 - Determining manning levels for each branch of ND
- Figure 3.1 shows the structure of the DOD.

C. GENERAL STAFF OF NAVY (GEN)

The A/GEN, is an officer elected by the KYSEA. The nomination is submitted to the DEM, and he submits this decision to the President. Finally, a Presidential decree ratifies this election. On appointment of the A/GEN the following authorities and responsibilities are assumed:

- He is a consultant of the DEM and responsible to him for matters pertaining to the Navy, such as correct organization, distribution of personnel, preparation for war, and readiness
- He is the president of the Supreme Council of the Navy and has a vote in the Council of Chiefs of General Staff
- He recommends to the DEM everything strictly related to the Navy which needs to be covered and established by law or other regulative decree
- He has the authority to make decisions affecting the formation of Navy units and services, as long as this action does not change the manning level of the Navy
- He recommends to the DEM the appointment of Navy flag officers and generally has authority as specified in Greek legislation

Figure 3.2 shows the structure of the Navy, providing a general view of the major subdivisions.

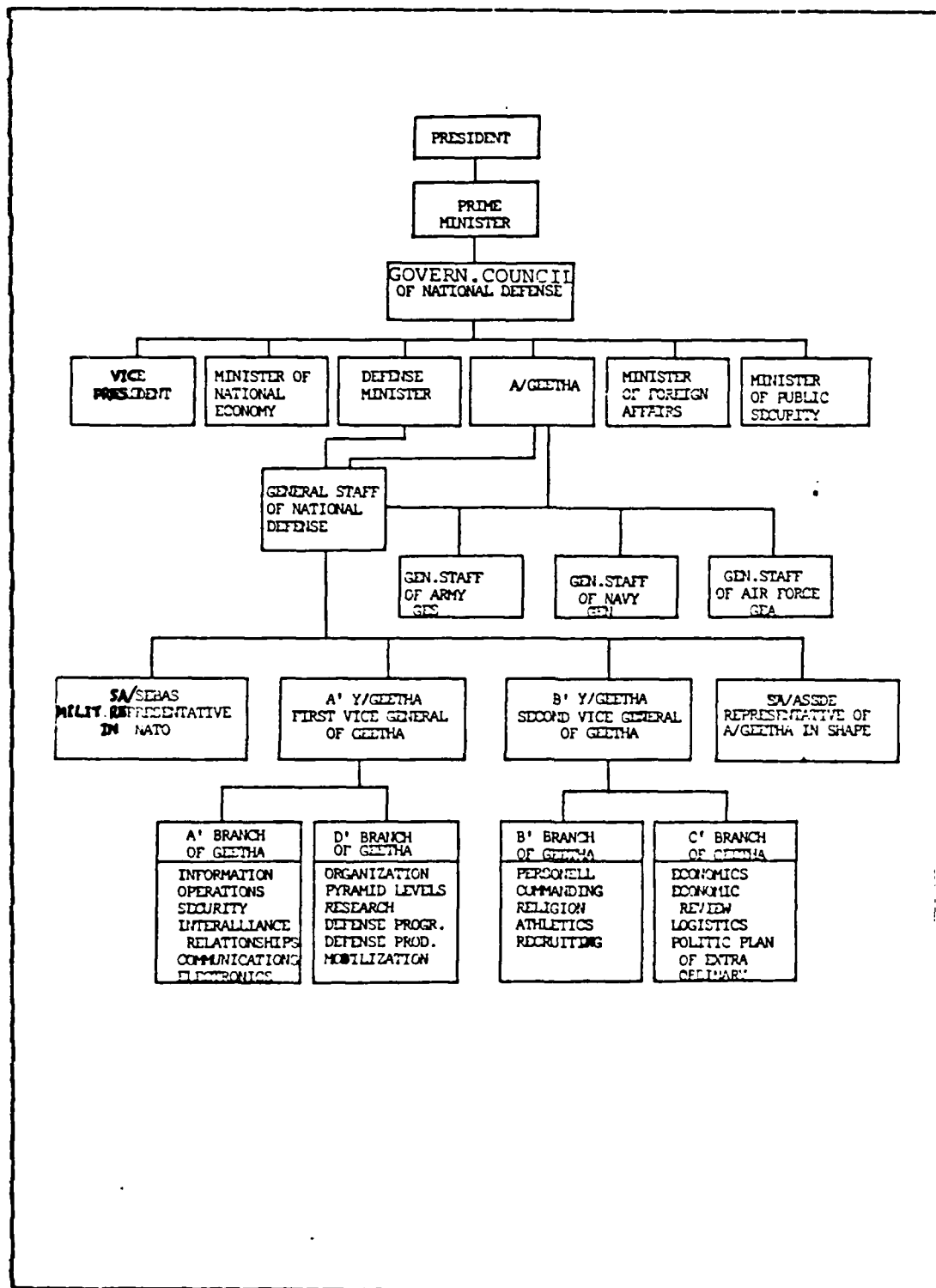


Figure 3.1 Department of Defense

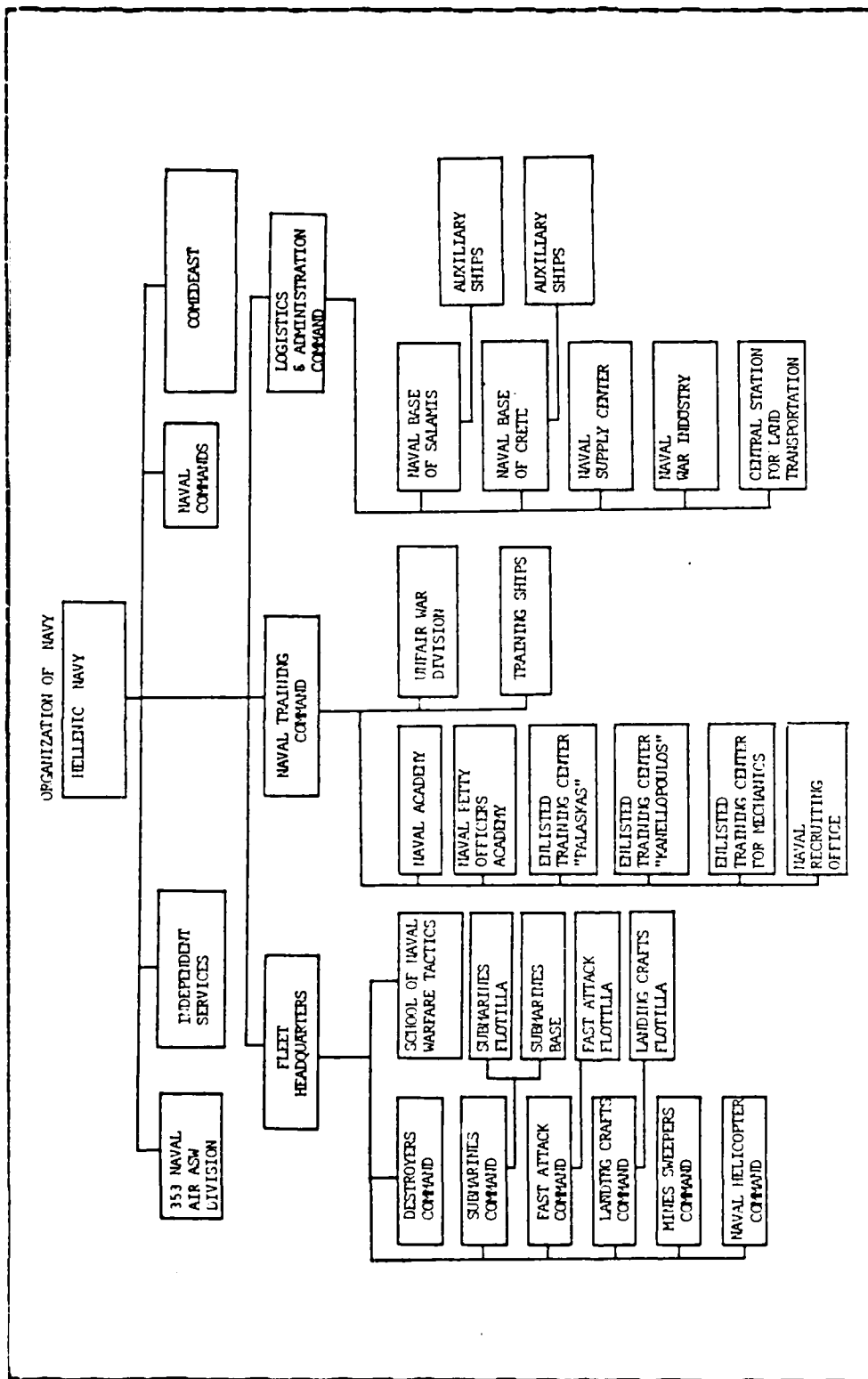


Figure 3.2 Organization of Navy

IV. ACQUISITION MANAGEMENT PROCESSES IN U.S. NAVY

A. CONCEPT OF THE ACQUISITION PROCESS

The System Acquisition Process means the establishment of a sequence of acquisition activities, that start from the agency's reconciliation of its mission needs, with its capabilities, priorities and resources, and are extended through the introduction of a system into operational use or the otherwise successful achievement of program objectives [Ref. 2].

Major system acquisition programs are those programs that are first, directed at and critical to fulfilling an agency mission, second, entail the allocation of relatively large resources, and third, warrant special management attention.

Additional criteria and relative dollar value thresholds for the determination of agency programs to be considered as major systems under the purview of the OMB Circular A-109 may be established at the discretion of the agency head [Ref. 2].

Circular A-109 represents a general concept that focuses its attention in written rules, procedures, and policies as they have been established since April 5, 1976. All the above provisions must be followed by the executive agencies of the Federal Government for the purpose of improving the process of acquiring major systems.

Circular A-109 covers the management of the acquisition of major systems including the analysis of agency missions, the determination of mission needs, the setting of program objectives, the determination of system requirements. Also the system program planning, funding, research, engineering,

development, testing, and evaluation are included. In addition to the above procedures, contracting, production, program and management control and the introduction into use are applied, through which management could achieve the program objectives.

All programs for the acquisition of major systems must be implemented even though the system is one-of-a-kind. In figure 4.1 the major systems acquisition cycle is indicated.

B. IMPLEMENTATION

Circular A-109 follows the policies implemented by the Circular A-76 which places reliance on the private sector for goods and services. It places emphasis on Congressional and executive leadership at the front end of the systems acquisition cycle. The decisions associated with the technical and program procedures depend upon the participating parties, the agency, and the operating/activity level. Circular A-109 states that the decision maker (SECDEF) has to implement the following primary decisions:

- To identify and define the specific mission, operational requirements that have to be addressed, the appropriate priorities within the agency, and the appropriate amount of funds to be invested (Milestone 0)
- To select competitive concepts for the system being designed, to establish and evaluate the criteria for test and evaluation, and to have the authority to construct and develop the concept into a single system (Milestone I)
- Commitment of a system to full-scale development and limited production (Milestone II)
- Commitment of a system to production (milestone III)

By the implementation of the circular A-109 policy many benefits could be expected, such as:

- Opportunities available to a wide spectrum of national industries to participate in government contracts in order to encourage industry
- Facilitate the exchange of information between agencies and Congress, by communication for the purpose of agreement with the Congressional Budget Act of 1974. This act requires refcom 33 the President to submit his budget in January, 15 days after Congress convenes. This act also provides the guidelines for Congressional enactment
- Decrease cost overruns
- Acquisition of major systems by the agencies would be a common process which would still be flexible enough to meet unique needs

By implementing these policies a large amount of money could be saved by avoiding program start-ups. Because these programs could be cancelled later on when it would be realized that the need did not exist, or other programs were given a higher priority, or the proposed program was able to be satisfied by other with less cost. [Ref. 4].

C. CIRCULAR A-76

As noted above A-109 relies on the participation of private industry in accordance with the policies established by the circular A-76.

Circular No A-76 was issued by the Bureau of the Budget in the 1966. Its expressed policy was an affirmation of the Government's general policy of relying upon private industry for non-governmental activities. An exception may be made in cases where the Government, after weighing the national interest, acquires the capability to produce systems and services it needs directly.

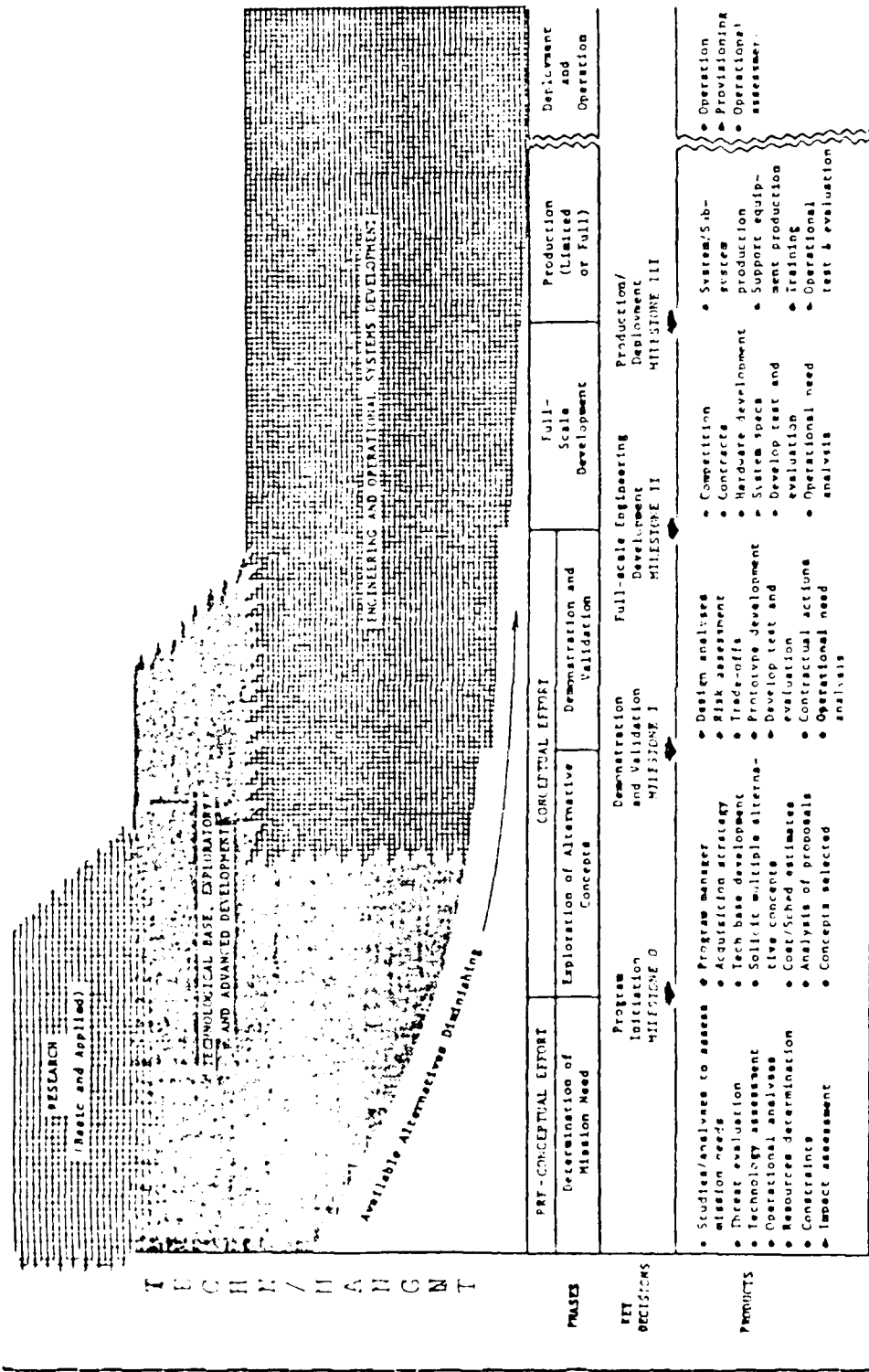


Figure 4.3 The System Acquisition Process

OVERVIEW OF PFBS

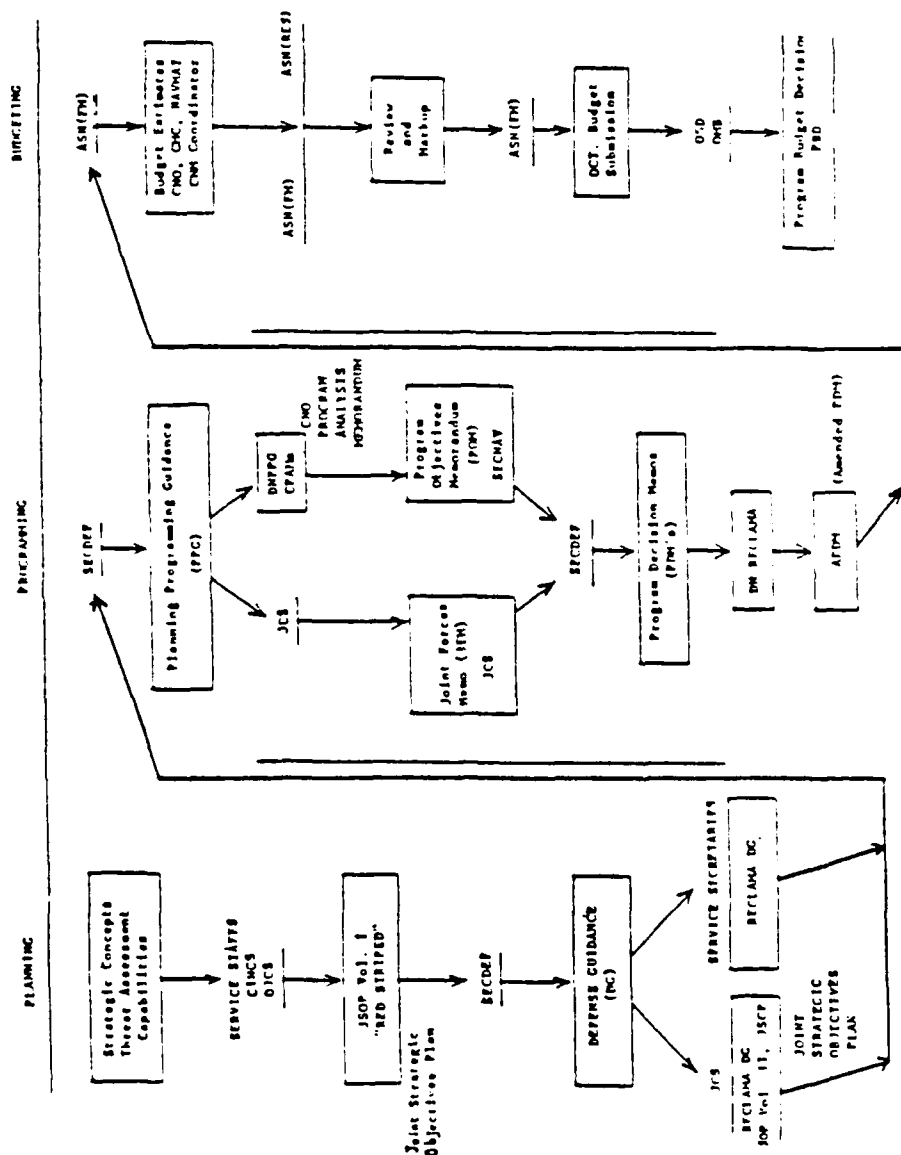


Figure 4.2 Overview of PPBS

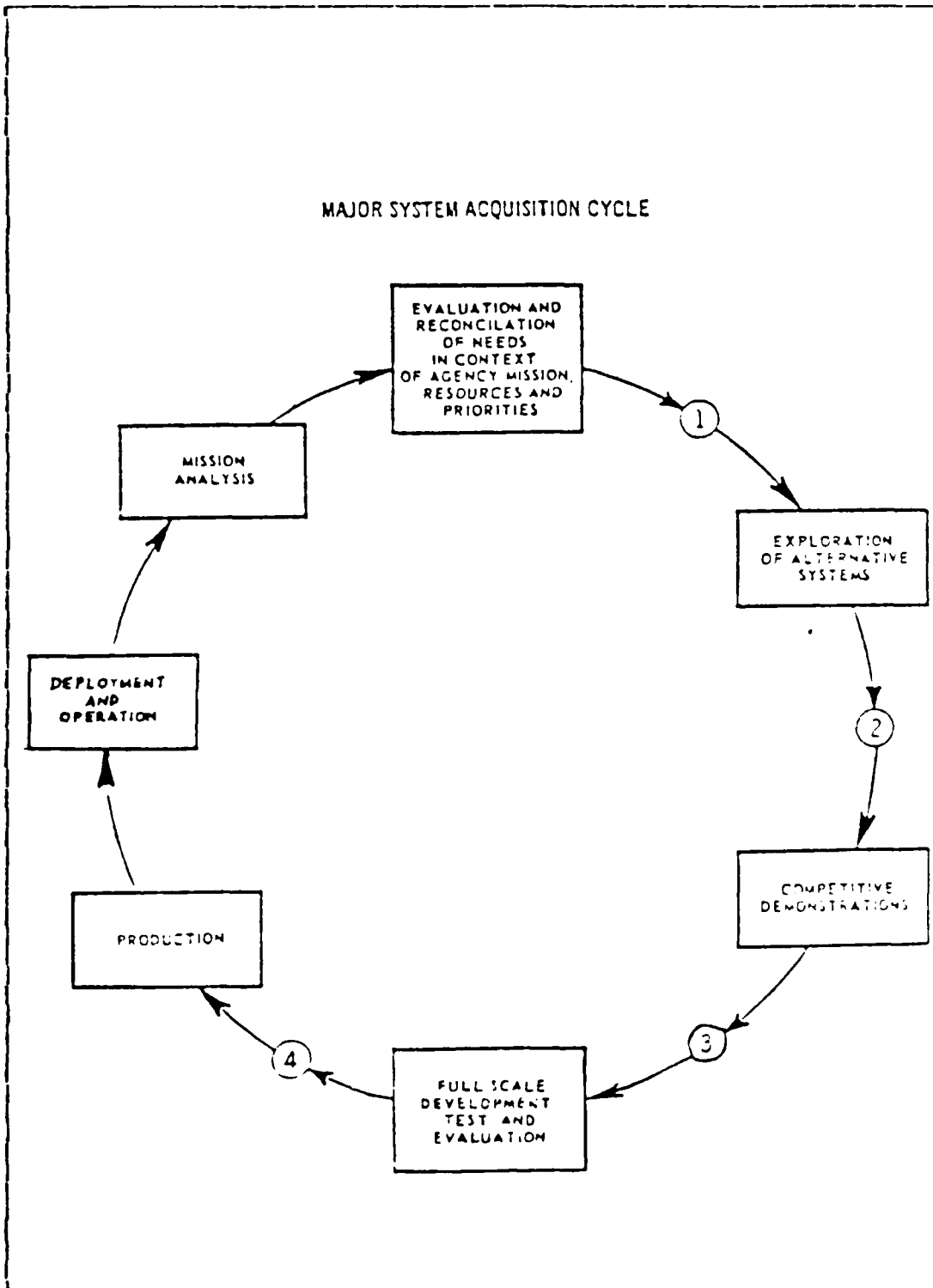


Figure 4.1 Major System Acquisition Cycle

The service secretary is aware for every stage in this phase, affecting the program, because he has the authorities such as:

- Submits quarterly reports to the SECDEF on key program issues
- Besides the time, in which the system is ready and so it can be deployed to the using activity and finally to give his advice to the SECDEF. In addition to that, the DAE and the OSD are kept informed of the progress of the program, by the service staff

5. Production and Deployment Phase

Generally speaking in this phase operational units are trained, equipment is procured and distributed, and logistic logistic support provided. The preplanned product improvements are applied to the equipment as required [Ref. 14].

The production and deployment phase includes the activities between the production approval decision and the delivery of the last system to the active forces.

For the purpose of summarizing all the above milestones, acquisition phases, and the required documentation, figure 4.13 is attached [Ref. 16].

As a summary description of all the above actions, the system in this phase is fully developed, engineered, fabricated, tested, and a decision rendered on its acceptability for entering the Navy's inventory. Concurrently, nonmaterial aspects required to field an integrated system are developed, refined and finalized. [Ref. 14].

The third and final milestone decision point is referred to as the production decision and the subsequent deployment as it is shown in figure 4.12.

In many cases a comprehensive view of the major program rests upon the lowest level in an organization, so it is possible in certain cases the decision authority may be delegated for the milestone III decision. Normally this decision is given by the SECDEF, but this may be given for Navy programs to the SECNAV. This authority is not given to the SECNAV, when thresholds established in milestone II have been breached.

In order for a major program to enter into the production and deployment phase, a recommendation needs to be made by the service secretary to the SECDEF, based on the progress of the program. The content of what has to be done is summarized in the DCP, that has to be updated with latest briefings affecting the program. The DCP is reviewed by the DSARC III group, which represents the top level DOD corporate body for system acquisition, and provides advice and assistance to the SECDEF [Ref. 9].

Although the major program is going to reach its final stage before being provided and accepted by the operational forces, the SECDEF makes a reaffirmation on mission need. If the reaffirmation is favorable, then his approval provides the "green light" and the program can enter the last phase. A quantity of the system will be produced to meet the operational aspects of the service. Besides, production items are examined under more intensive and extensive operational tests and evaluation.

(IPS) contains more specific information on the program. When the DCP does not provide enough information for the decision, then an IPS is required for the milestone II decision. This fact is considered by the Defense Acquisition Executive (DAE) [Ref. 13].

The SDDM documents the SECDEF's decision for the program to proceed into the full-scale development phase, after his favorable reaffirmation of the mission needs.

4. Full-Scale Development and Milestone III

During this phase considerations take place about the reestablishment and the updating of the threat, associated with the mission element need. Also the acquisition strategy has been updated and is being executed and supported by business planning. Business planning includes provisions for flexibility in production rates and the appropriate quantities for different options. Major considerations are refined including acceptable and realistic cost and schedule estimates. Affordability and system cost effectiveness remain major considerations. Major program problems have been resolved. The fiscal year thresholds have been examined and the appropriate reaffirmation has been made, while the necessary balance between cost, performance and schedule has been maintained through effective tradeoffs. Four other factors that are prerequisites for the program to enter into the production and deployment phase are logistics, operational considerations, manpower and training. The program manager is supported in his duties and responsibilities, and a review of production readiness is completed. This readiness means that the contractor is familiar with the program as it has been designed, its required quantities, and hence he has the necessary capability to build it [Ref. 10]. In figure 4.11 the Full-Scale Development phase is indicated.

Among the others, these elements have to be thoroughly reviewed and well defined. The recommendations that have been suggested, are supported by the completed demonstration and validation tests. Other characteristics in this phase are the requirements for long-lead procurement items and possibly initial production, for the purpose of supporting the operational test and evaluation needs, verifying the production engineering, and establishing the appropriate production base [Ref. 10].

To achieve the above results, the contractors are required to submit their firms' proposals. The dollar threshold can not be exceeded to carry the program into the next phase. The Under Secretary of Defense for Research and Engineering (USDR&E) and the Assistant Secretary of Defense (ASD), monitor the demonstration and validation phase and in the case of exceeding the program dollar threshold, it has to be reviewed critically.

Finally two documents are used, the DCP that is updated to reflect the progress made during this phase, and the Test and Evaluation Master Plan (TEMP), through which the documentation, identification, and integration of the testing and evaluation is accomplished prior to milestone II and III program decisions.

After the completion of the demonstration and validation activity, the decision as to what is the preferable system to be selected rests upon the SECDEF. He selects the system to proceed into the full-scale development phase. For this reason, he conducts the DSARC's review. The DSARC's review and consideration is based on two documents, that have different concepts and include different levels of details. Precisely the DCP represents a top-level document, that summarizes the identification of a series of concepts, such as alternatives, goals, thresholds, and threshold ranges. On the other hand, the Integrated Program Summary

SECDEF approval. Test and evaluation plans are made as early as it is possible and practicable. The Decision Coordinating Paper (DCP) represents the principal document in this phase. Its purpose is to support the Defense System Acquisition Review Council (DSARC) reviews for SECDEF decision milestone I [Ref. 11]. Figures 4.6, 4.7, 4.8, 4.9 show all the high level personnel involved in decisions affecting the major system acquisition.

3. Demonstration and Validation Phase and Milestone II

When the approval of the SECDEF has been given and documented in the Secretary of Defense Decision Memorandum the DON proceeds into the phase I, Demonstration and Validation, where selected alternatives are refined through extensive study and analyses, hardware development, and test and evaluation. The object is to validate the selected solution(s) and provide the basis for determining whether or not to proceed into the next phase. Figure 4.10 shows the Demonstration and Validation phase including all the required procedures. The main objective of the demonstration and validation phase is the identification of the concept that has the greatest potential to meet the mission need, in a cost effective manner. The Program Manager is responsible for making trade-off decisions [Ref. 12].

The SECNAV confirms the mission needs, and if necessary the threat is updated. In order to achieve the most effective balance in cost, performance and schedule, necessary trade-offs are made including operational, logistics and energy considerations. Also determination is made, as to whether the selected system satisfies the mission element needs, it is cost effective and the stated constraints can be established. The risks that are involved in the demonstration and validation phase, are consistent with major elements such as cost, performance and schedule estimates.

The JMSNS is to be submitted by the OPNAV to the Chief of Naval Operations (CNO). If the proposed JMSNS is approved by the CNO, OPNAV attaches this to the budget request, through which programming subject to the constraints of the fiscal year is implemented. This instrument is called the Program Objectives Memorandum (POM) and represents a comprehensive and detailed expression of the total resource requirements associated with the total commitment of each DOD component. The development of each POM follows specific details that are implemented on an annual basis.

OPNAV then submits the proposed POM to the Secretary of the Navy (SECNAV) for review and approval, and in the case of new starts the approval constitutes the Navy's mission need determination decision and recommends the program to enter into the Concept Exploration phase.

Finally, the POM is submitted to the SECDEF for review and approval. In this situation SECDEF's answer is included in the Program Decision Memorandum (PDM). After his approval it is included in the DOD Budget and so the permission has been given for the program to begin the Concept Exploration Phase, as it can be seen in figure 4.5.

2. Concept Exploration Phase and Milestone I

The overall purpose of this phase is the selection of one or more competitive approaches to meet the mission requirements. Its major concerns are performance, cost, schedule, supportability, and standardization. During this phase proposals are requested, evaluated and reviewed, trade-offs are considered. Two significant activities occur. The assignment of a Program Manager (PM) and the formulation of the acquisition strategy [Ref. 9].

Finally, the concepts that best meet the mission requirements are selected and recommended for SECNAV and

In figure 4.3 the whole acquisition process is summarized, including all the milestone decisions [Ref. 8].

G. ANALYTICAL APPROACH TO MILESTONES

1. Mission Need Determination

For the purpose of initiating a new acquisition program there are two basic requirements: Mission Need Determination and Allocation of Funds.

The various organizations of the Navy conduct mission analyses which are submitted to the Office of the Chief of Naval Operations (OPNAV). This submission, based on the described mission analyses, helps OPNAV to identify the element needs and to evaluate the existing systems, regarding their capabilities and deficiencies.

In addition to that, a possibility may exist to increase the capability of major systems or to replace them with less costly and more effective alternatives, when the relative opportunities are available.

The basic required document that is used by the Department of the Navy (DON) is the Justification of Major System New Start (JMSNS).

The DOD component requires a JMSNS for all new starts where it predicts that the money to be spent is:

- More than \$200 million for RDT&E, or
- Production-more than \$1 billion in production, or
- The SECDEF characterizes the new system as "major"

On the other side, JMSNS is not required for technology base programs, regardless of the required size. These programs include all the necessary laboratories, elements and tools through which the advanced knowledge could be discovered and implemented. Also included is the expansion of the existing bases necessary to accept the updated improvements in technology. The requirement of a JMSNS is indicated in figure 4.4.

leading up to their procurement. The phases related to the milestones are indicated below

1. Mission Need Determination (MND) or Program Initiation.

Based on a justification for a new start, the program initiation is completed in the PPBS process. Approval of a program gives the authority to proceed into phase 0-Concept Exploration. Policy requires that alternative system concepts be compared and evaluated to pick the best solution to the mission need. The Military Service is in a position to proceed into this phase when it has the SECDEF approval of its budget.

2. Milestone I

This decision represents a validation and approval of the alternative solutions that have been selected and a determination as to whether or not to enter into the next phase, after an extensive study of costs, readiness, objectives, and affordability.

3. Milestone II

In this stage the SECDEF's approval is given to proceed with the Full-Scale-Development phase. This approval means that the SECDEF intends to deploy the system. In this phase operational tests and evaluation take place on development models and/or limited production units.

4. Milestone III

Finally this decision includes the approval by the SECDEF for the program to proceed into phase III. This phase, Production and Deployment, begins with the approval for production and extends through the period in which the major system is introduced into operational use.

E. SYSTEM ACQUISITION IN THE U.S. NAVY

The basic mission of Navy system acquisition is to carry out effectively and efficiently all the programs needed in order to achieve the required operational objectives.

These acquisitions will be managed in an adequate and appropriate way after the implementation of the following principles [Ref. 7].

- Elimination of superfluous program reviews and requirements for documentation and the establishment of a schedule of review milestones in such a manner as to allow smooth transition between the acquisition phases
- Establishment of an organization that minimizes the span of control for program review, while maintaining adequate control of the overall acquisition process
- Implementation of a strong relationship between PPBS priority and personal decisions associated with the program being built and controlling the growth of the cost among the programs
- Consideration of all necessary internal and external program elements such as the required personnel, training and logistic support, for the purpose of establishing and following an acquisition strategy
- Procedures such as development of improved long range plans, cost estimates, realistic budget and economical production rates will lead to increased program stability
- Improvement of productivity by building well-balanced trade-offs between LCC and system effectiveness
- Strengthen the industrial base

F. MILESTONES AND PROGRAM PHASES GENERALLY

There is a clear distinction between the various acquisition phases that are required of all major systems,

sophisticated measurement of the effectiveness of the system.

Before the implementation of PPBS, the control of the acquisition process was a function of financial control. That is, a service could start as many programs as it could afford, and priorities were a matter of management opinion rather than a high level planning process. There were disadvantages in the whole process because:

- The rotation of personnel resulted in the reduction of the scope or changing of the objectives established by the previous responsible individuals
- There were contradictions because the enthusiasm of the personnel of the service to start as many programs as could be possible was not in agreement with the public and the Congress

Due to the above two described reasons, and in addition because the appropriations used were made annually (Congress could reduce these programs), the result was a lack of an available means by which the continuity from year to year for a plan or objective of a service could be assured.

SECDEF McNamara started an approach to program budgeting by introducing the planning-programming cycle. This cycle included programs which were required by the services relative to the national strategy. That is, programs would be funded based on their priority in terms of the national strategy. As the need was quantified, the next step was the development of the maximum cost effectiveness procedure, in order that the available funds to be acquired.

Charles J. Hitch developed and installed the PPBS concept which represents the bridge connecting the functions planning and budgeting shown in figure 4.2 [Ref. 6].

This policy was unchanged until the year 1979, when Circular A-76 was revised in CMB to include three guiding principles.

1. Government-Private Sector

The Government must rely on the capabilities of private industry. It has to focus its attention on the private sector in order that its resources be exploited. The Government may sign contracts with commercial companies to satisfy its needs. All these actions are necessary for the purpose of acquiring its systems and services, because the government must avoid competition with the private sector.

2. Cost Reduction

Much effort will be given to controlling the various costs concerned. This means that when the systems constructed by industry meet the desired performance parameters, there will still be concerns about how to reduce the cost and society will require a detailed examination of the various factors that have been involved in the total cost, for the purpose of acquiring the most economical system.

3. Cost Minimization

The third principle consists of the strong relationship between in-house governmental capabilities and the related public interest to minimize the cost.

D. PPBS CONCEPT

From the early part of the 20th century until 1940, the budget process had the purpose of controlling actual expenditures.

From 1940 to 1950 the concept changed and it shifted to justifying the budget estimation by more advanced and

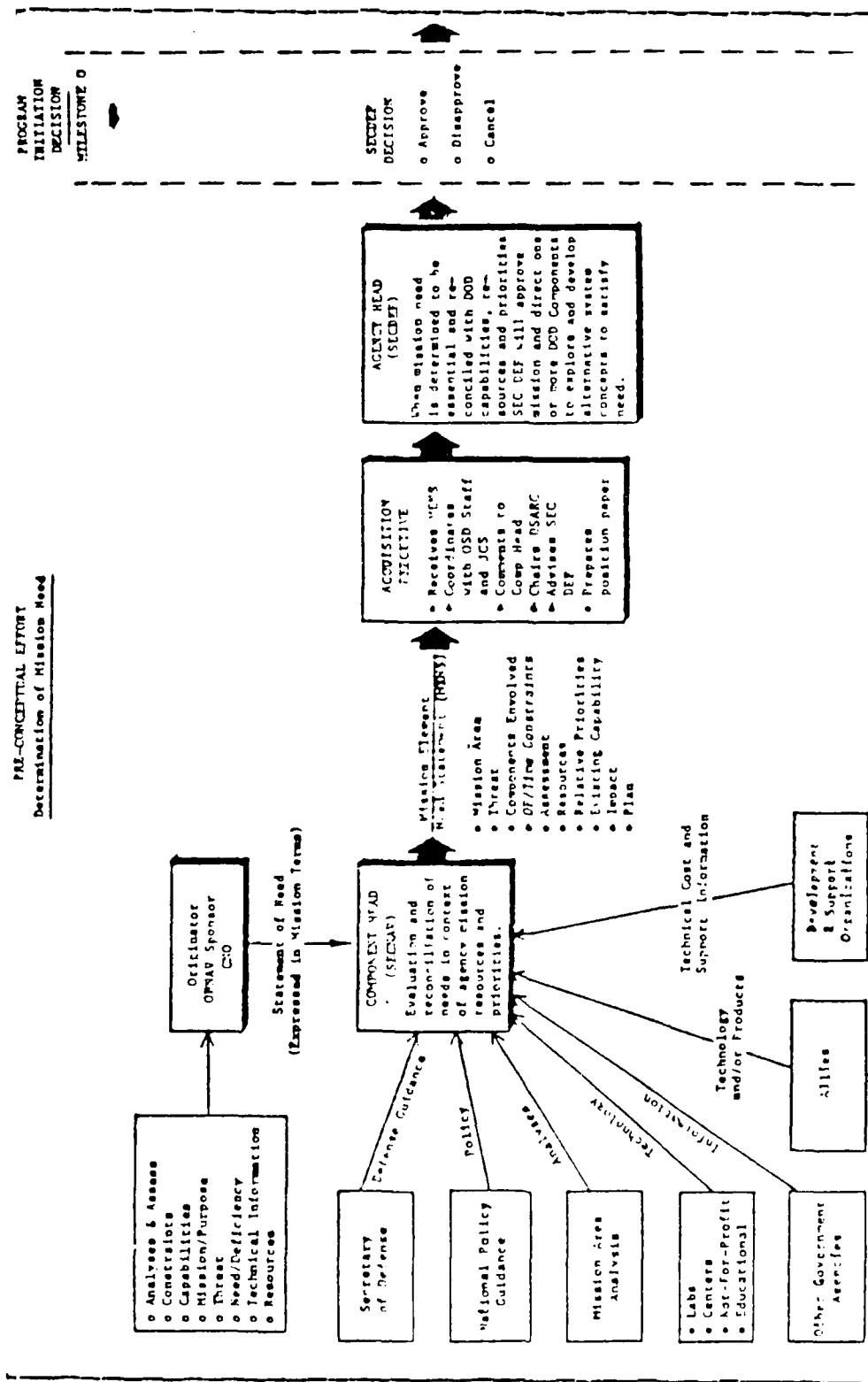


Figure 4.4 Pre-Conceptual Effort

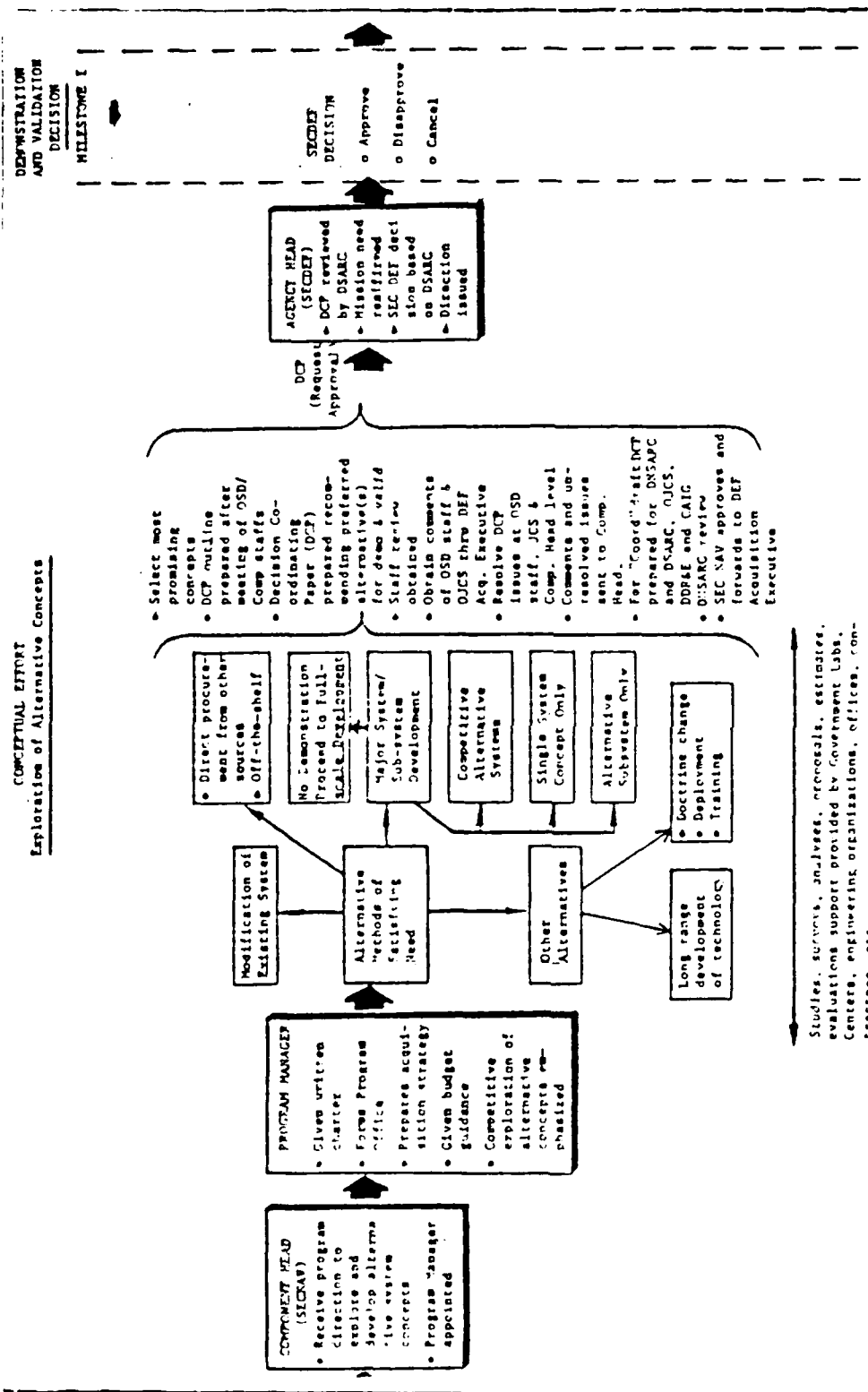


Figure 4.5 Conceptual Effort

KEY PLAYERS

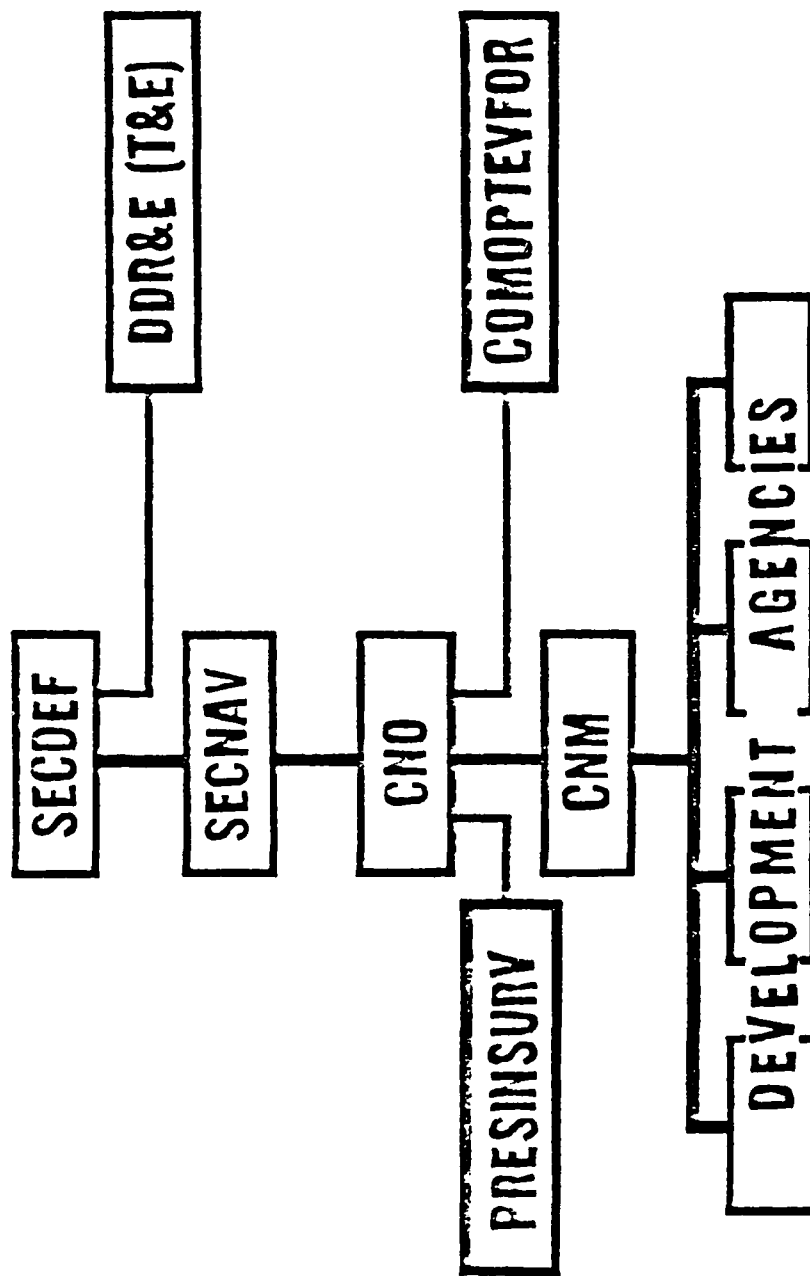


Figure 4.6 Key Players

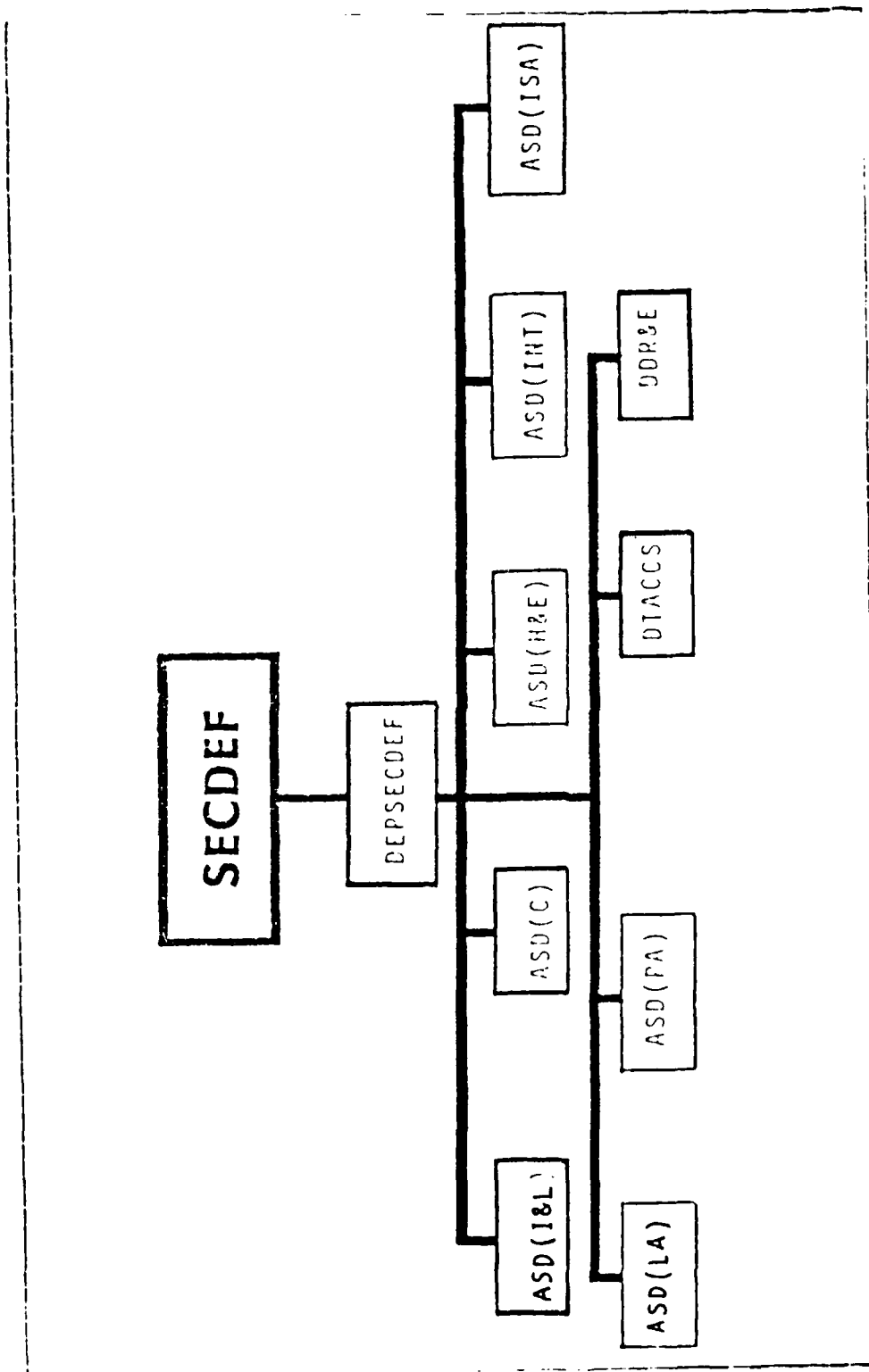


Figure 4.7 Secretary of Defense-SECDEF

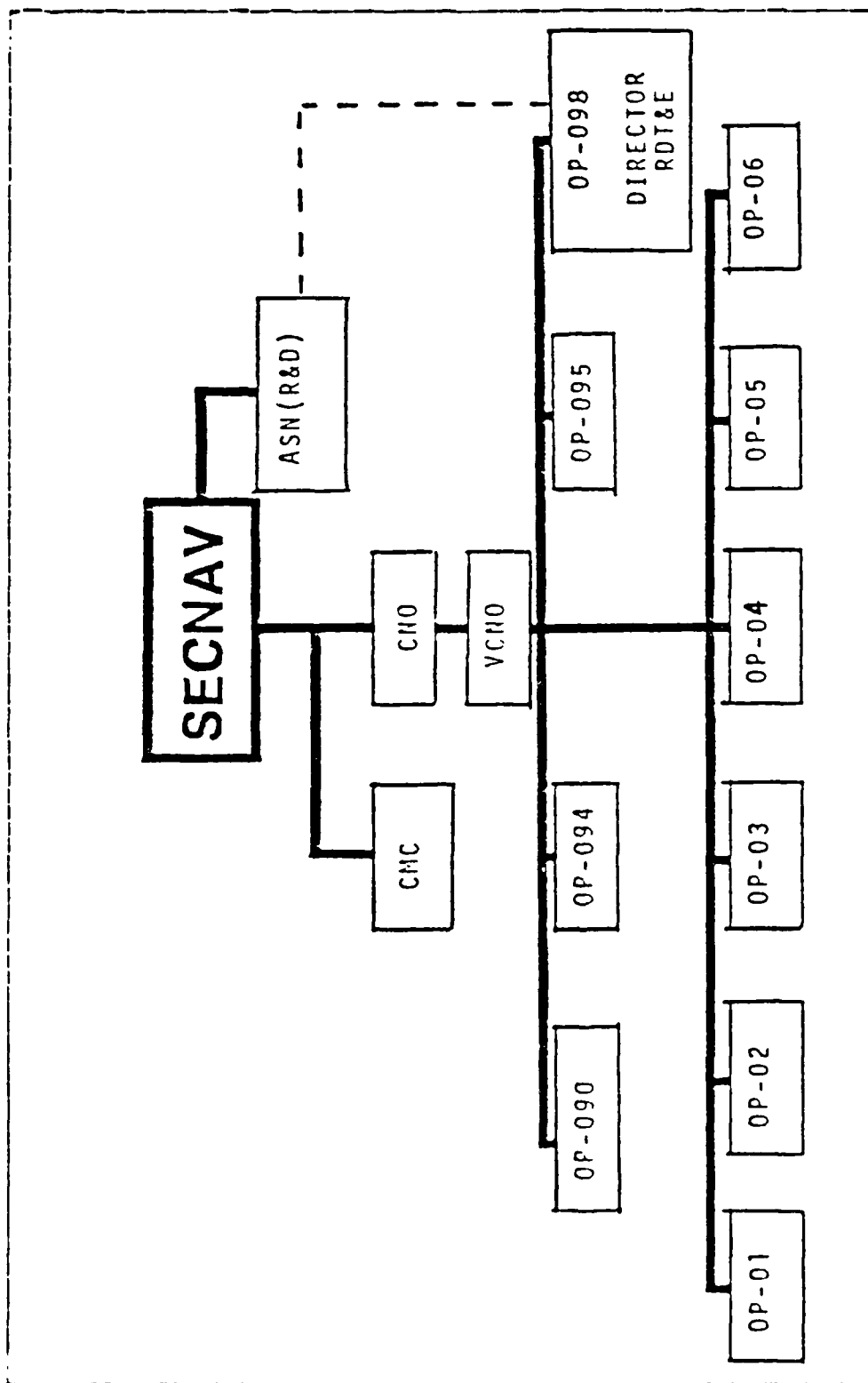


Figure 4.8 Secretary of Navy-SECNAV

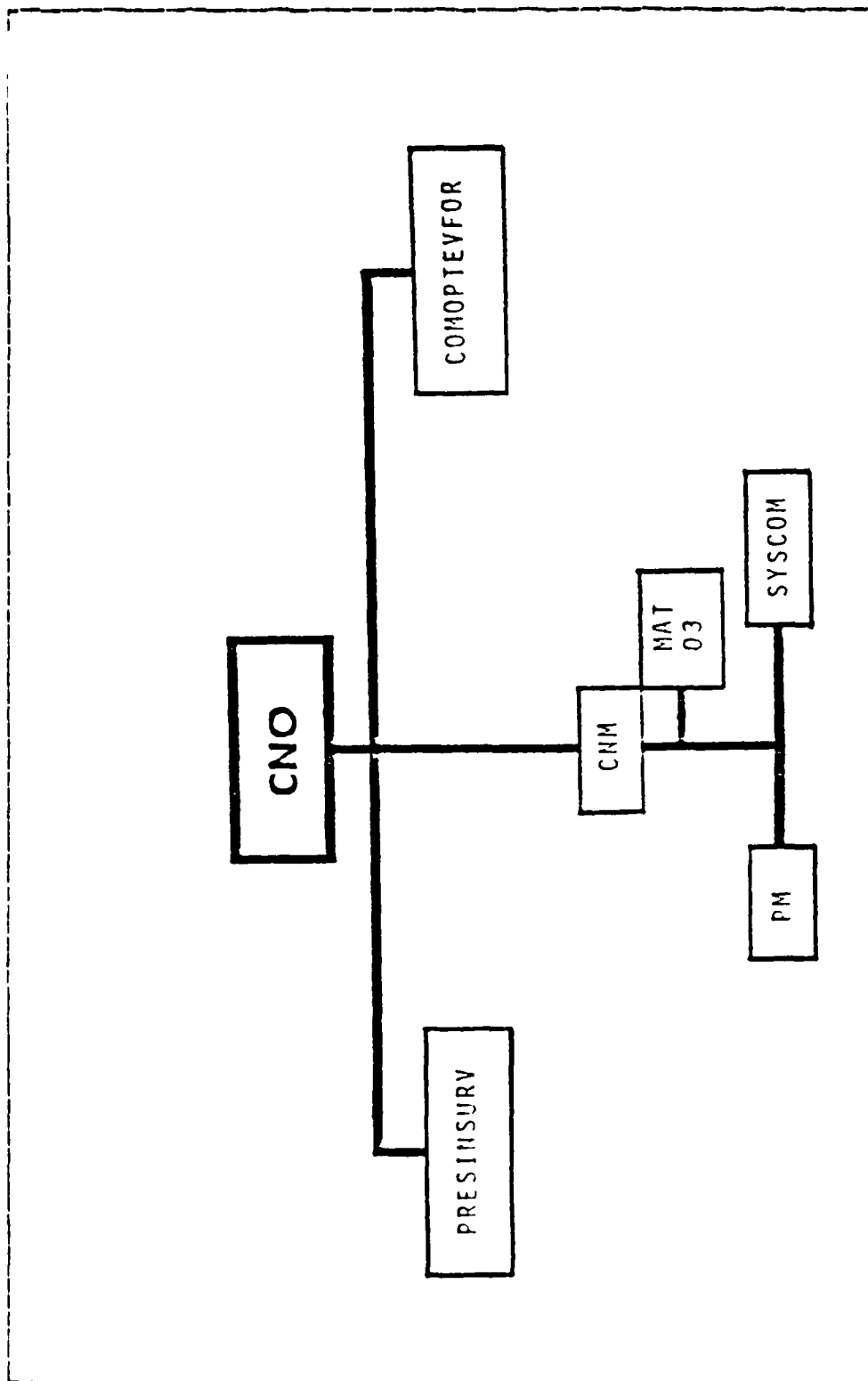


Figure 4.9 Chief of Naval Operations-CNO

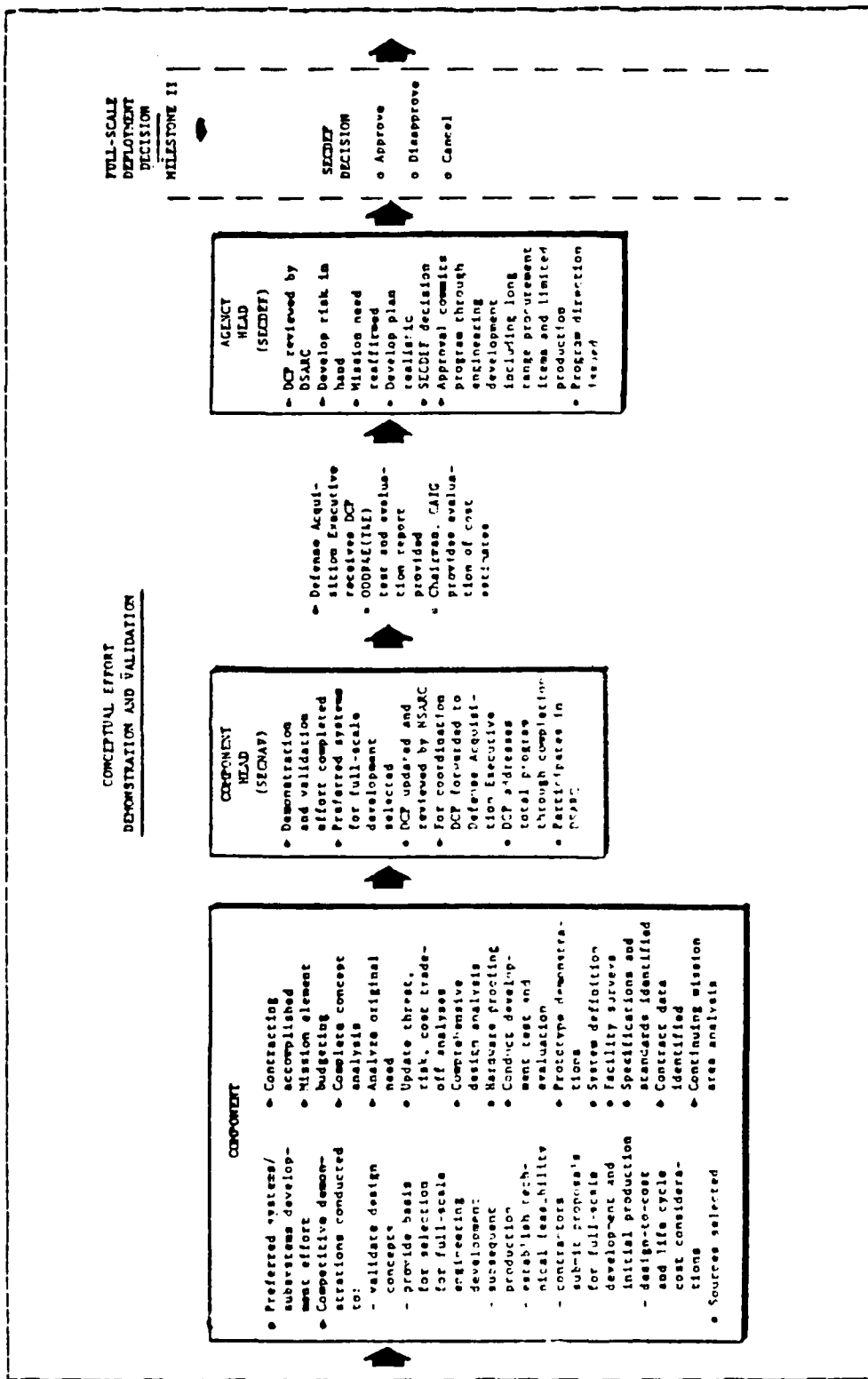


Figure 4.10 Demonstration and Validation Phase

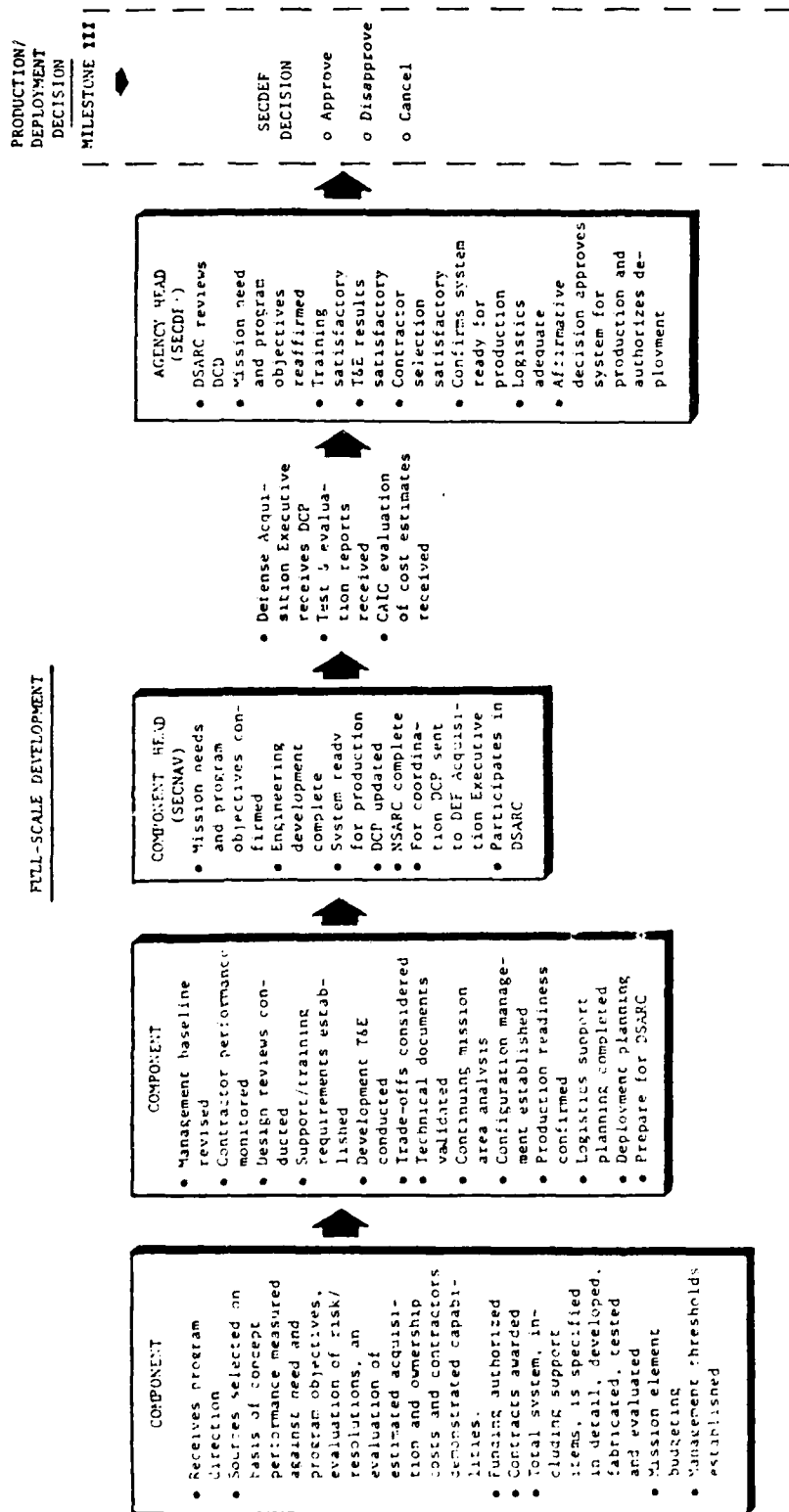


Figure 4.11 Full-Scale Development

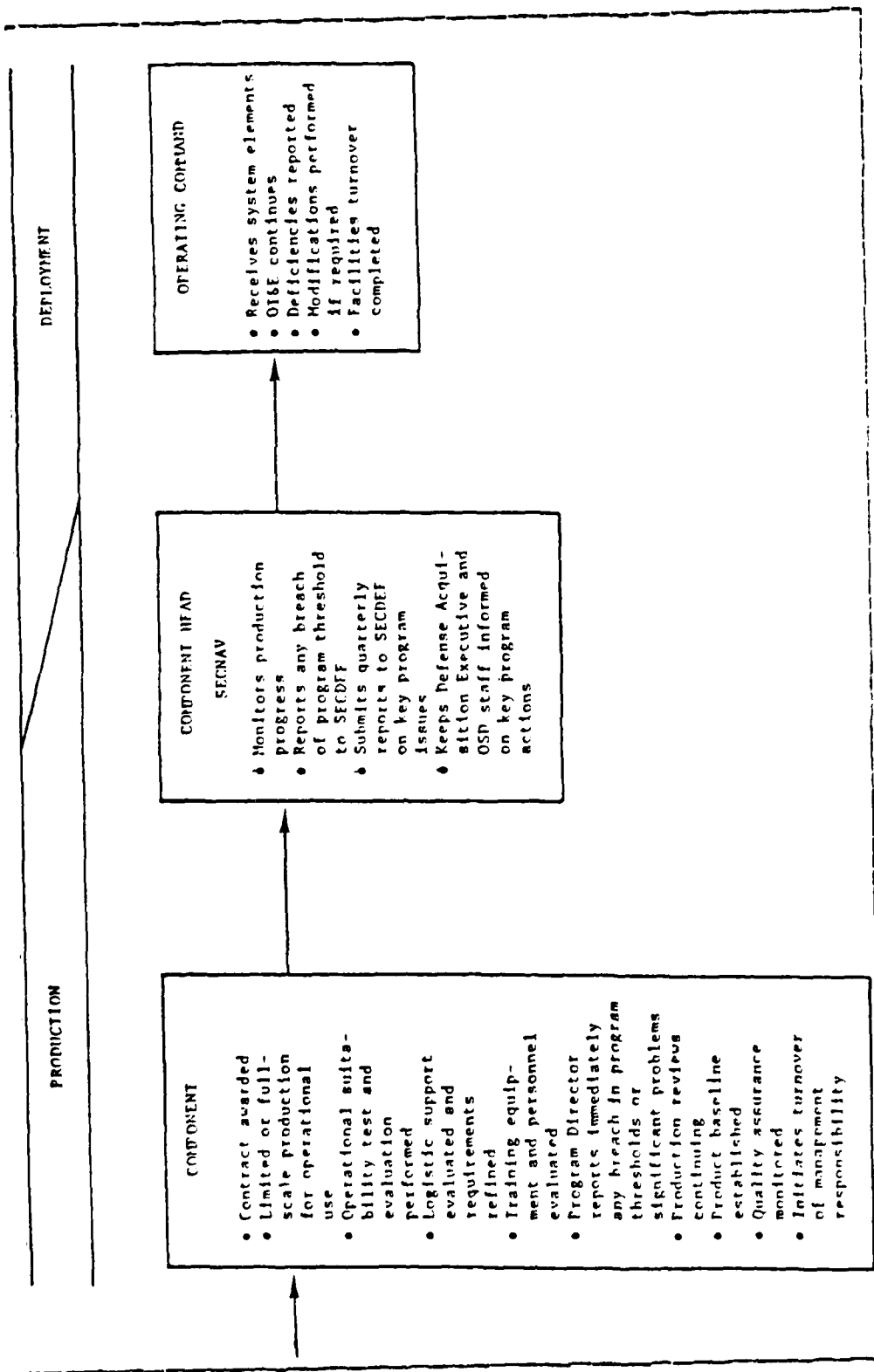


Figure 4.12 Production and Deployment

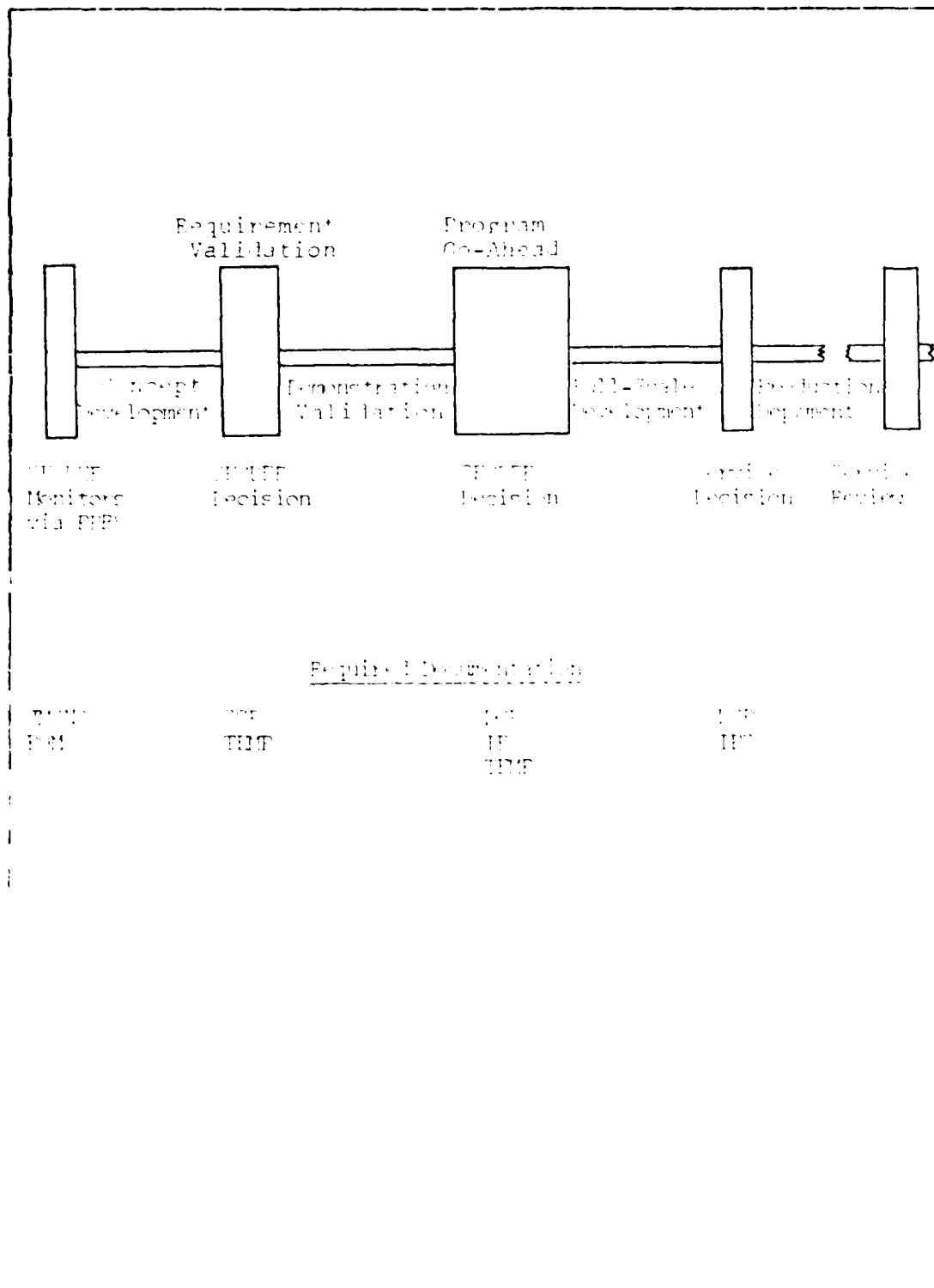


Figure 4.13 DOD Acquisition Improvement Program

V. SYSTEM MANAGEMENT AND COST IN THE US NAVY

A. PROGRAM/PROJECT MANAGER

Program Management is the maintenance of a balance among technical and operational resources, and business and financial management resources to provide an affordable end product suitable for the fleet to perform its mission. The business and financial management disciplines weigh heavily in the decision making process. The necessity for business discipline in systems acquisition is provided through business expertise to the Program Manager [Ref. 17].

In other words Program Management represents a concept due to which an individual is chartered (officer or civilian) to whom authority and responsibility is given, in order to carry out the planning, directing, controlling and accounting for an approved project [Ref. 6].

The PM is usually assigned after the mission need determination decision, and during the concept exploration phase. But there are exceptions. That is he may be assigned prior to the above decision, especially when the urgency or the magnitude of an anticipated effort warrants

The PM's charter is approved by SECNAV in the case of major systems. He has to operate under this charter, and to take into account major factors such as, approved performance/schedule constraints, and thresholds and funding constraints for the purpose of conducting the program within those factors.

In the real world he does not always operate under the charter. Sometimes he is faced with unusual conditions either from the contractor's point of view or from his workers [Ref. 18].

Some characteristics are strictly related to the concept surrounding the PM. He has to have a thorough understanding

of the environment he works in. Also he has to have the ability to rapidly adjust a whole organization to program changes. From his responsibilities, he has prerogatives that can be used in the whole procedure of constructing a major system. These prerogatives include the technical control of the program, the approval of specifications for the major system, approval of the subcontractor's plans, technical guidance as far as the selection of subcontractors, and finally the approval of change proposals that affect the contract.

The PM reports directly to the SYSCOM or NAVMAT or in some instances via the Project Director. In any case there are no more than two levels between the PM and the supervisor to whom he reports.

DODI 5000.2 defines an acquisition strategy as the conceptual basis for the PM's overall plan for program execution and requires its generation as soon as it is possible after milestone 0. The scope of this action (early planning) aims at providing the overall direction to the acquisition effort. Because of the complexity inherent in establishing the various goals and objectives related to the acquisition effort, the PM must essentially consider what has to be done in order to establish the proper assurances that the acquisition will be successful. In these great responsibilities the PM is supported in his effort by the contracting officer. The distinction between them is that, while the PM is responsible for the overall acquisition planning, the contracting officer must coordinate, develop and maintain the formal acquisition plan itself [Ref. 19]. Figure 5.1 shows the relationship of these two participants in the planning process.

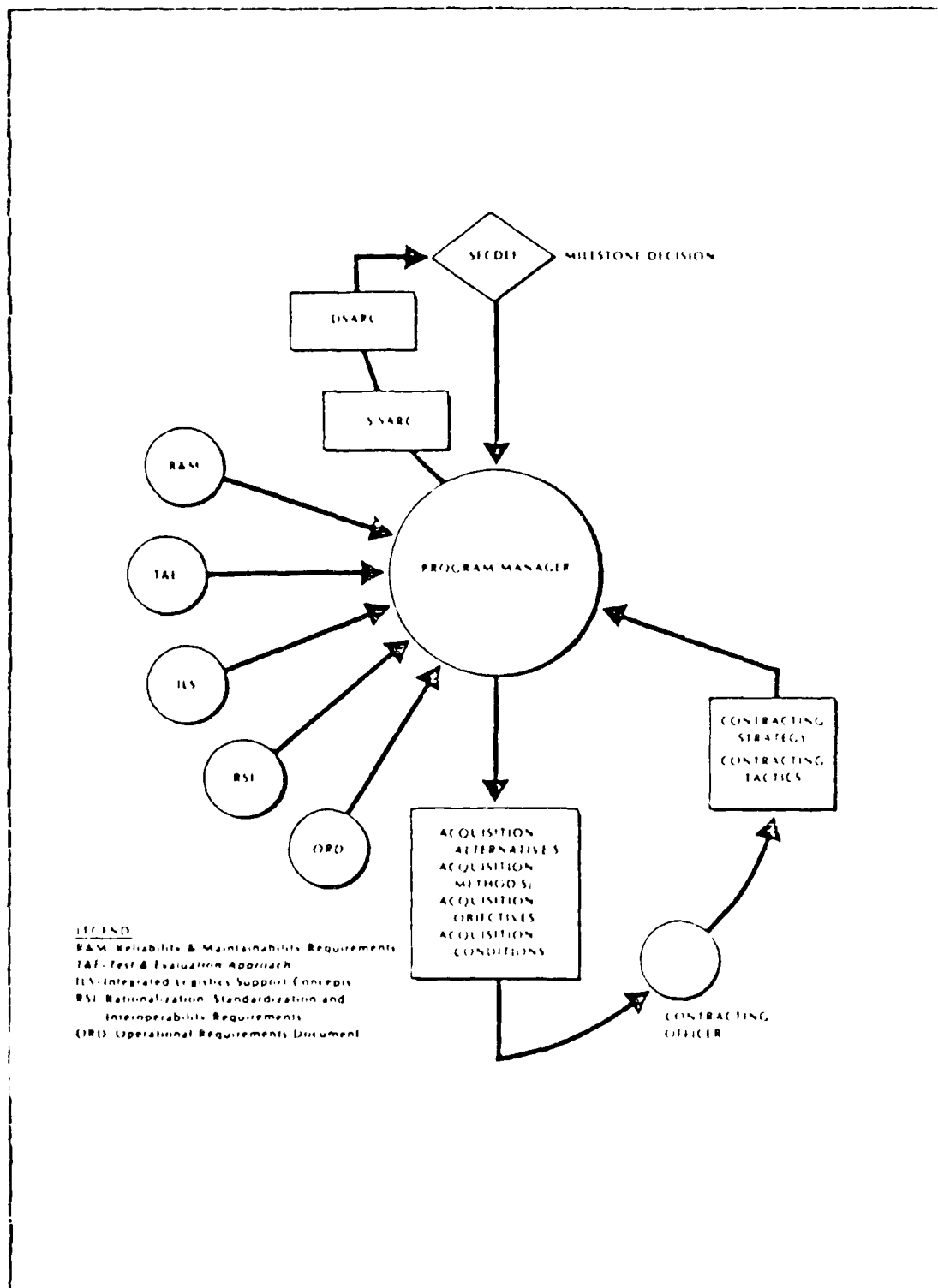


Figure 5.1 Acquisition Planning Process Model

B. THE SYSTEM'S LIFE CYCLE COST (LCC)

Every major weapon system is designed to be useful, sufficient and effective over a specified period of time. It must satisfy the need. Also it must have the necessary flexibility on a continuing basis, over that period of time, for the purpose of justifying the expensed money and other investments. Therefore, a prime objective for the system is its development within the specified constraints of operating and maintenance costs. Figure 5.2 shows the major elements involved in cost effectiveness and some of the influencing factors and their relationships.

review is made by the Council of Chiefs of General Staffs where the system is proposed by the A/GEETHA.

3. KYSEA via DEM

The final decision as to whether the system will be acquired or not rests upon the Governmental Council of National Defense. This proposal is submitted to the council by the DEM. The KYSEA operates under the chairmanship of the Prime Minister who has the responsibility to inform the parliament of Greece about the acquisition whenever a political party requests such information. The A/GEETHA is usually invited to participate in the KYSEA in order to express his opinion about specific details that may be questioned by the member ministers.

Figure 6.2 indicates the decision participants within the DOD, and figure 6.3 indicates the stages that take place in ships acquisition process.

E. COMMITTEE OF ATTENDING AND ACQUIRING THE SYSTEM

1. Domestic Industry

When approval is given by the KYSEA and the contract is signed by the two parties the A/GEN is authorized to appoint a committee of four (usually officers) whose duties and responsibilities are defined in a written order signed by the A/GEN. These duties consist of attending and acquiring the whole construction of the ship(s) in all its(their) phases and stages. The specific responsibilities of this committee are also included in the contract [Ref. 35].

This agreement states that the buyer will appoint specialized and authorized representatives, from now on referred to as "inspectors" or "Committee of Attending and Acquiring the Systems", who will supervise the faithful

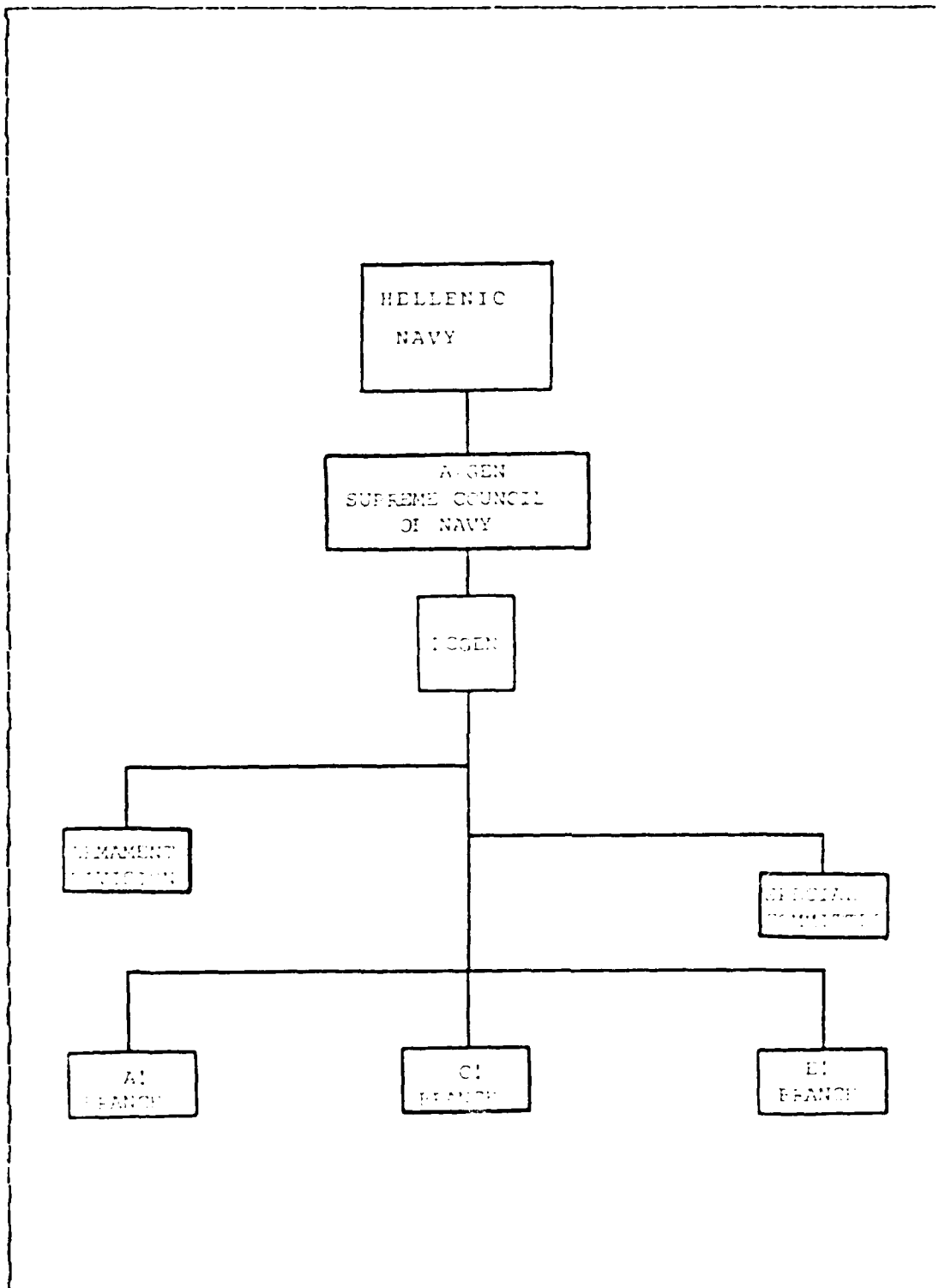


Figure 6.1 Decision Participants in the Greek Navy

After the completion of the above examinations, visits, observations, and appraisals, the committee submits its detailed descriptions to the DCGEN. The DCGEN has the authority to approve, cancel, or to change the document if he believes that the committee did not appraise some key factors, although these two latter situations represent exceptions. If his approval is given, then the document is sent by his office again back to the armament division. This division is the only one that selects the major system to be proposed, and submits the IM to the A' branch for further evaluation in operational aspects and requirements. Figure 6.1 shows the decision participants within the Navy.

D. FINAL MAJOR DECISIONS

The IM is submitted to the C' branch that attaches, in the form of memos, its detailed information about the logistics evaluation and economics coordination. The final memo is attached by the E' branch including matters pertaining to affordability due to the budget, thresholds, and flexibility due to which the major system could be payed.

1. A/GEN via DCGEN

The DCGEN may add his final observations and notifications before the submission of the document to the A/GEN. He finally introduces the document to the Supreme Council of the Navy, which may accept or reject it. Approval of this final proposal authorizes proceeding into consideration by the GEETHA.

2. DEM via GEETHA-SAGE

The A/GEETHA may express his opinion upon the proposed system. However, a review is made by the branches of GEETHA similar to those made by the GEN. Likewise a

a. Political Involvement

Since every industry operates under the law of the nation in which it is located, the government has the authority to prohibit the sale of such systems in another country (embargo).

b. Third Parties's Involvement

In some cases the committee may be faced with the extra involvement of an industry that did not make its appearance during the early stages of the evaluation and appraisal of the advantages and disadvantages of a weapon system.

c. Negotiations

Negotiations take place between the interested country and the various manufacturers before the agreement. Their scope consists of exchanging information as far as the behaviour of the system in the real world. In such cases the committee may visit the plant and/or the laboratories of the negotiator's industry in order to acquire first hand information about the specific characteristics of his product. Also the negotiations cover topics such as the required quantity of the system, the time limits within which the system will be provided to the interested party, financial and technical guarantees, and procedures for the payment until the acquittance.

d. Legal Restrictions

The special committee takes into account that some countries are subject to the constraints imposed by legal restrictions, for what is referred either to the production and/or the sale of major weapon systems.

submits the document to the office of the Deputy Chief of GEN (DCGEN).

2. Deputy Chief of GEN

The DCGEN carries the authority to reinspect and redefine the specific aspects among those that are submitted to his office. Approval of the IM authorizes proceeding into the next step. That represents a written order given by the DCGEN through which a special committee is established.

3. Special Committee

This committee operates under the chairmanship of a captain or a flag officer with previous related experience. The committee includes 5 to 7 officers with advanced and specific knowledge in matters pertaining to engineering, mechanics, communications, artillery, etc. Among them a supply officer is included who has the responsibility to verify criteria relative to the national economy and contracting situations. He may have experience in contracts, rather than scientific background in contracting procedures as these criteria are well defined in the U.S Navy.

The special committee has the authority and the responsibility granted by the DCGEN, for a detailed examination and appraisal of the wide spectrum of major weapon systems and to take into account the two major factors, the need and the optimum system. If a proposed system satisfies the acceptable level of the requirements but fails to meet the optimum level it may be rejected. Other criteria that the committee may be faced with include political involvement, third parties' involvement, negotiations with the interested parties necessary to select the one that meets the Navy's needs, and legal restrictions. [Ref. 34].

insufficient to cover all these needs, then the increase in the given amount depends upon the government's discretion.

The designation of the optimum system in parallel with the estimation of the need are the two principal factors that cover every acquisition of a new major system. The alteration of these systems are also stabilized by the same factors. In order to approach this problem, the Navy establishes scientific information, industry information, and the details that are coming to the Navy's branches. Any existing systems in the international market must be inspected by the services, and tested to demonstrate their capabilities in the real world regardless of their specifications.

Since Greece does not have the capability to construct such systems, it has to rely upon foreign industries, which offer a variety of modern weapons systems.

C. ACQUISITION PROCEDURES

1. Branch A'

For whatever is referred to the Navy's procurement of major systems, the branch A' (plans and operations) is authorized to identify the security need and the required appropriate program to meet this need. For that purpose it makes its suggestions to the armament division (ARD), in a document called "Introductory Memorandum" (IM). The ARD is staffed by specialists in technical matters so it focuses its attention on how to establish all the necessary technical requirements, included in the same document. The suggestions of the ARD include improvement of the proposed requirements for the purpose of establishing additional criteria or, on the other side, elimination of the factors that could also cover the required specific characteristics of the proposed major weapon system. After the preparation of these details, the office of the director of the ARD

VI. ACQUISITION MANAGEMENT IN THE GREEK NAVY

A. THREAT ASSESSMENT

Greece has belonged to the NATO alliance for thirty-four years. Although major weapon systems are acquired for the purpose of establishing a strong force in this southeastern Mediterranean corner, characterized as critical by the alliance, Greece must also protect its borders and provide for the security of the Nation.

Threats coming from every direction are evaluated by the proper services. Their decisions are defined, estimated, refined and proposed to the high level decision makers who belong either to the GEETHA or to the Government.

Like all economies in the growth stage, the country is subject to a variety of constraints based on the appropriate reallocation of its resources. It has to measure the anticipated results from decisions that affect or could affect the stability of its major plans as they relate to the economic condition, public health, education, commercial trading, and generally the quality of life of its citizens. This is the main idea which the country has to establish in order to carry out all of its needs in an optimum priority.

B. NAVY NEEDS

The Navy has to establish, to implement, to carry out, and to provide to its forces major systems, taking into account the assessment of the need, and the constraints due to budget limits. Every year the government authorizes a certain amount of drachmae for each branch of the armed forces. The Navy has to cover its needs in major and minor weapon systems with this amount. If the budget is

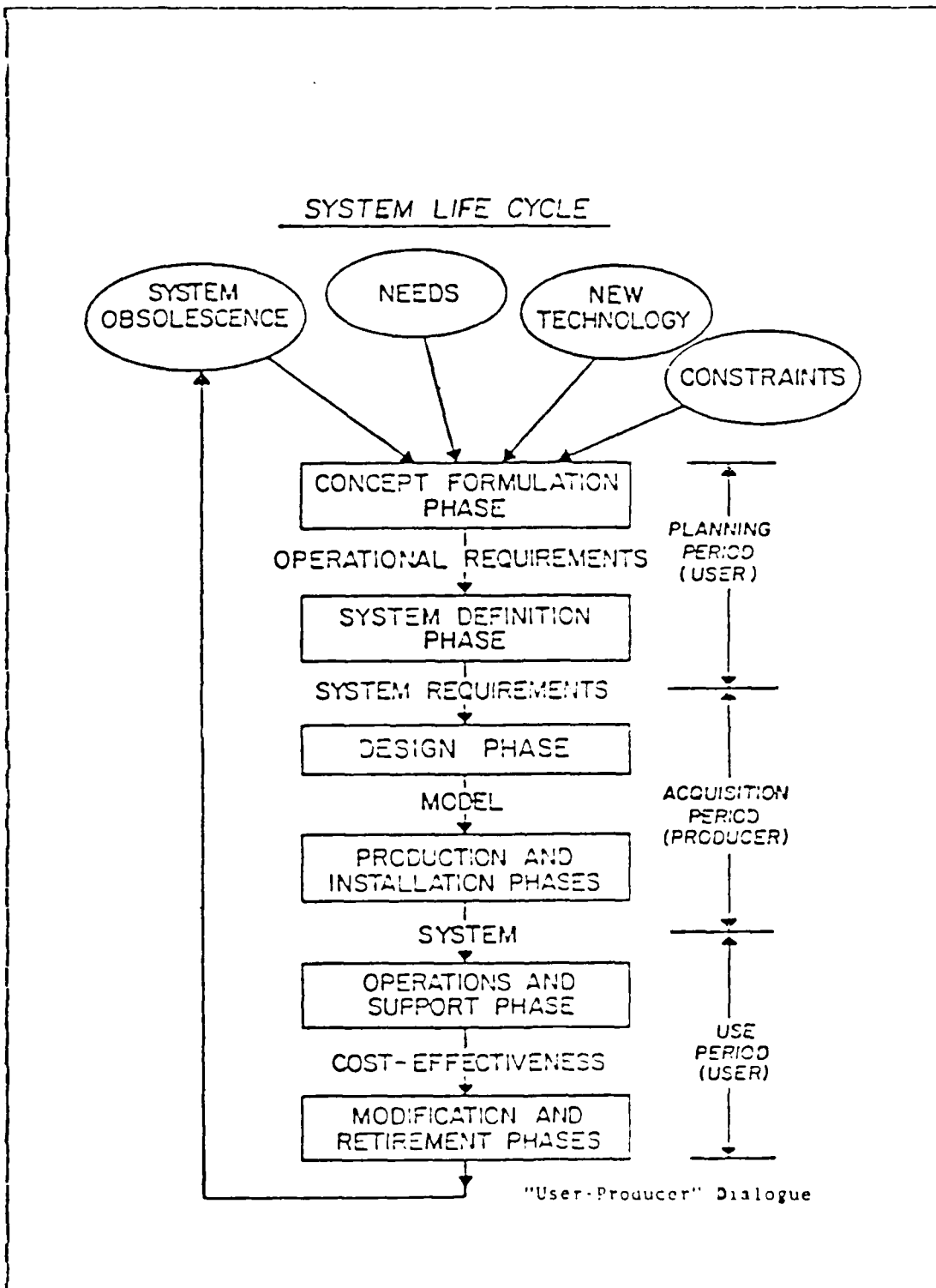


Figure 5.4 System Life Cycle

needs that the whole program requires. Instead of year-by-year current arrangements, these items are incurred only once during the program. A strong correlation coefficient exists between the cost avoidance and the type of item to be procured. The user may either procure a great amount of small items such as ammunition, yielding large amounts of money, or may buy a small number of large items. Needless to say, when the government allows the contractor to spend money up-front for productivity improvements and economic lot buys, it also incurs financial liability. This situation takes place when the program is cancelled. The Office of the SECDEF is leaning toward a conservative posture in which the services will be required to budget for the cancellation ceiling, thus removing this money from the available obligation authority.

Figure 5.4 shows the system life cycle with the existing constraints, needs and the new technology associated with the acquisition phases and the three periods: planning, acquisition, and use.

The existence of acquisition improvement actions affect the estimation of the cost-benefit ratio and cost avoidance. These actions include Pre-Planned Product Improvement (P3I), Multiyear Procurement, Capital Incentives, and the maintenance of a Warm Production Base.

C. PRE-PLANNED PRODUCT IMPROVEMENT (P3I)

This section will discuss the first action. The second action will be discussed in the following section, while the remaining actions will be discussed in Chapter IX pertaining to the establishment of new policies.

P3I is different than the idea of "product improvement". In a typical P3I program the system or product is designed in such a manner as to be ready to accept the new as-yet-unavailable technology and the new updated improvements. Electric power, weight, volume and provision of interfaces are allocated necessary for the future implementation of the anticipated improvements. Also the basic system and the development of the improvement are carried out in parallel. In other words they are seeking together to meet future threats through an orderly process.

A typical P3I program "has two principal costs: the cost of developing an improved technology in parallel with the basic technology and the cost of preparing the basic product to accept the improved technology. There are, of course, reasons other than cost avoidance for carrying out a P3I program, such as keeping alternate technologies alive and stimulating competition" [Ref. 22].

D. MULTIYEAR PROCUREMENT

The second action is multiyear procurement. In this action the contractor is in a position to purchase and construct certain items for the purpose of reaching the

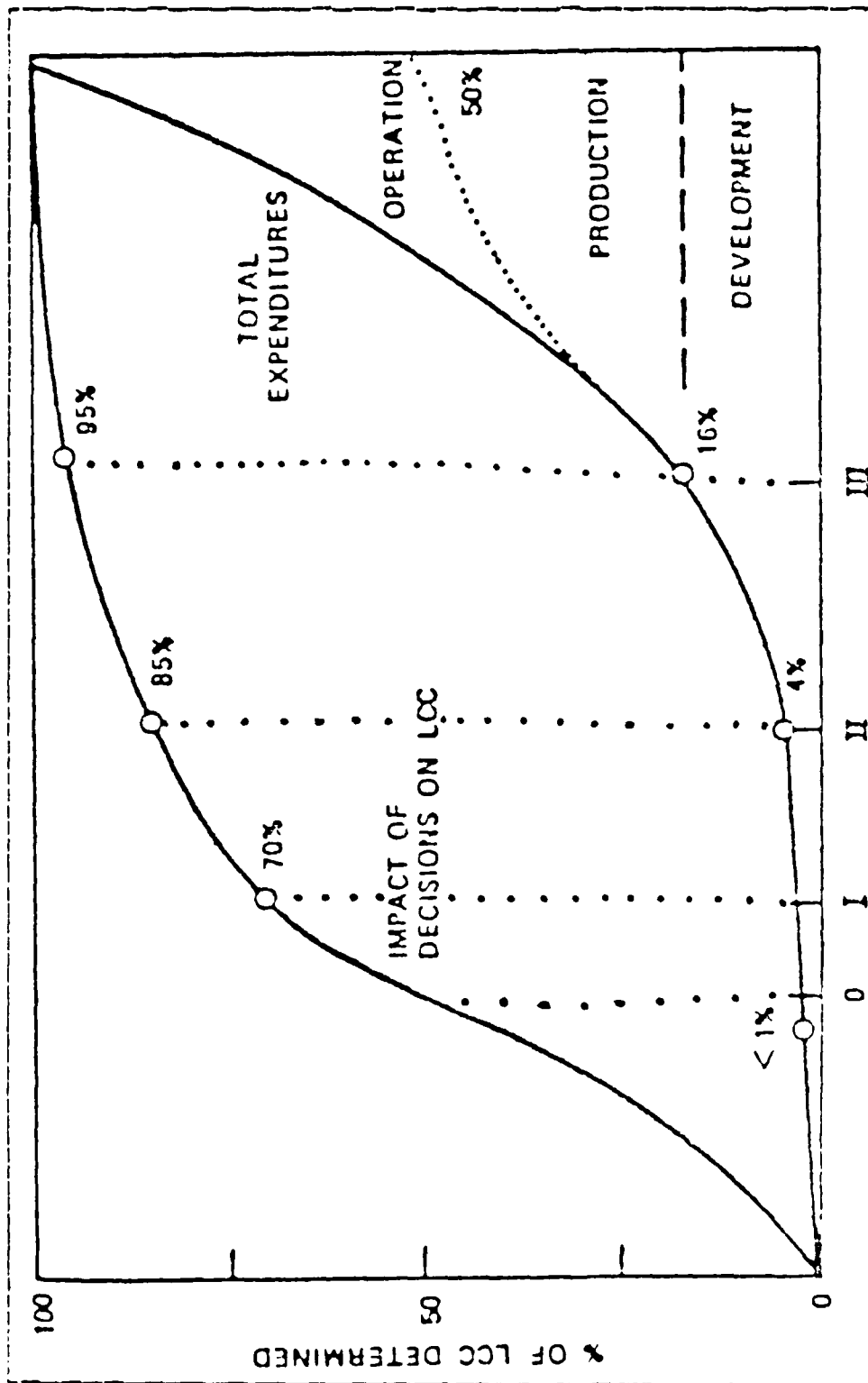


Figure 5.3 System Life Cycle. DSARC Milestones

milestone III decision. This event represents an indicator of the large leverage that expenditures up-front can have on expenditures later in the program. As a rule of thumb, the designer feels that the up-front spending of money gives him the promise that he may achieve benefits and significant savings over the life of the system.

LCC involves all costs associated with the system life cycle, to include:

- R&D Cost:

Research and development cost (R&D), the cost of feasibility studies, system analysis, detailed design and development, fabrication, assembly, test of engineering models, initial system test and evaluation, associated documentation.

- Production and Construction Cost:

Production models, operation and maintenance of the production capability, associated initial logistic support and support requirements.

- Operation and Maintenance Cost:

The cost of sustaining operation, personnel and maintenance support, spare/repair parts and related inventories, test and support equipment maintenance, transportation and handling, facilities, and modification.

- System Retirement and Phase-out Cost:

The cost of phasing the system out of the inventory due to obsolescence or wearout, and subsequent equipment item recycling and reclamation as appropriate [Ref. 20].

The LCC of a system is strongly influenced by the decisions made in its early stages. Decisions that are made during the concept exploration phase, until the milestone I decision, fix approximately 70 percent of the life-cycle costs. Roughly 85 percent of the life-cycle costs are locked in before full-scale development phase begins. It is obvious that this pivotal phase's decisions with respect to the logistics support strategy establish both support costs of the system and operational costs. In figure 5.3 it is shown that expenditures up-front are but small fractions of the total LCC of a system. Precisely 95 percent of LCC is incurred in the production and deployment phase, after the

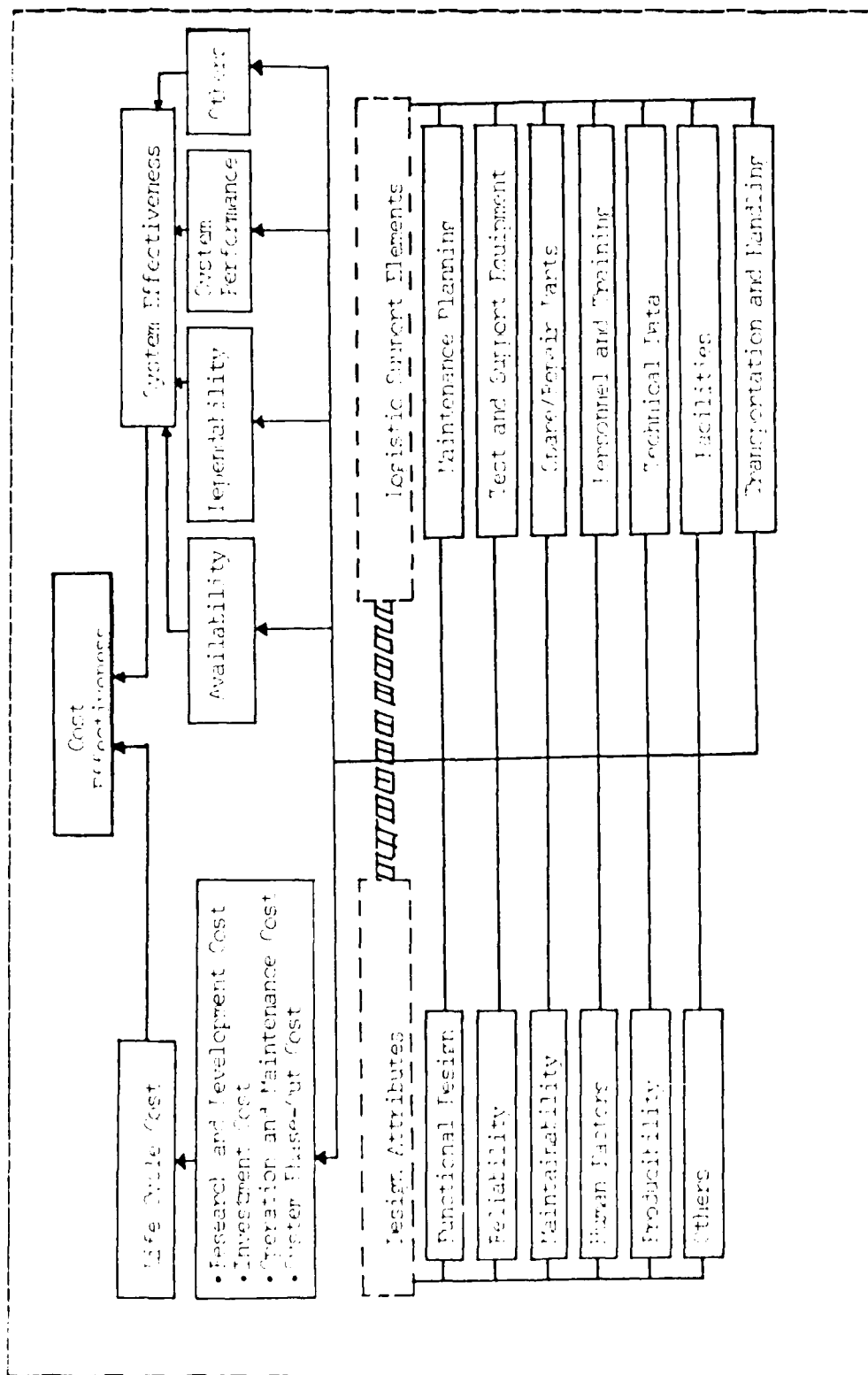


Figure 5.2 The Basic Ingredients of Cost Effectiveness

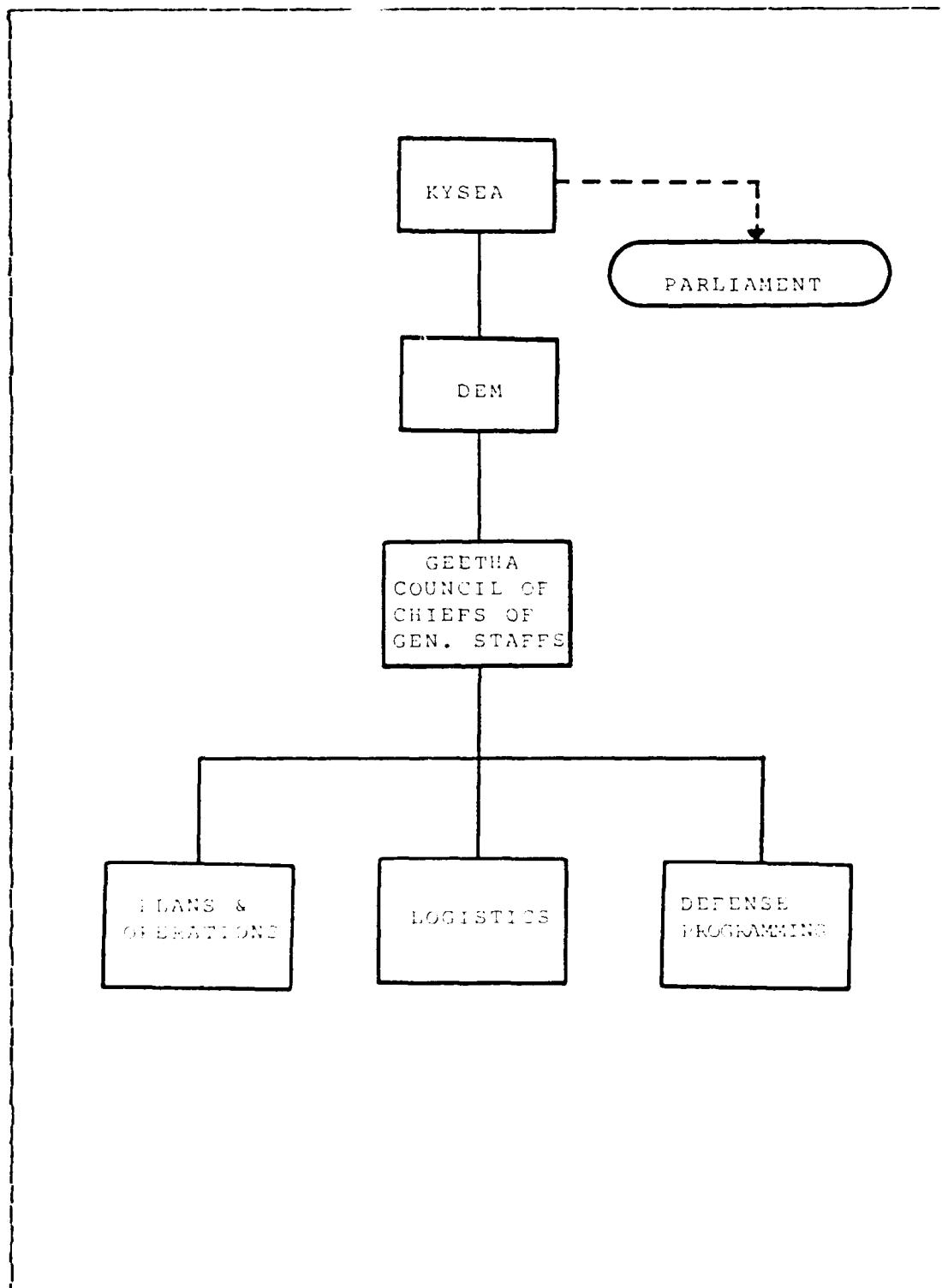


Figure 6.2 Decision Participants in the DOD

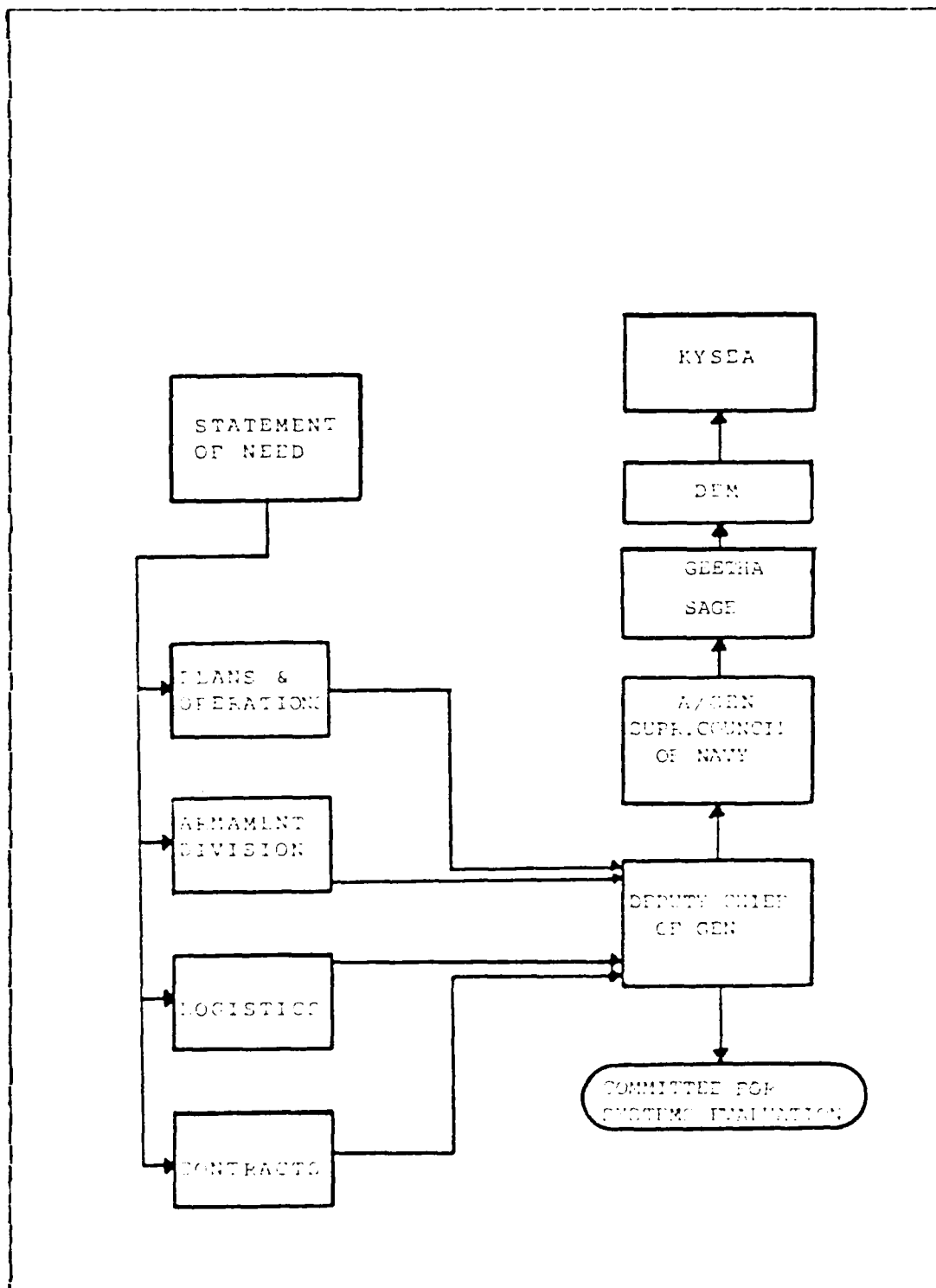


Figure 6.3 Stages in HN Ships Acquisition Process

execution of the agreement in all its stages. The inspectors and the committee may be the same person. Nevertheless, until such inspectors or committee are appointed, the manufacturer will apply to the buyer himself, who will carry out the duties of the inspectors or the committee. The manufacturer will follow the suggestions of the inspectors as far as they agree with the contract and the specifications of the ship. The duties, rights and obligations of the inspectors/committee are described below.

Acquisition and delivery of the ship will be based on the following documents:

- A protocol of acquisition and delivery is signed by the head inspector and by the manufacturer following the trials that are provided by the agreement and by which (protocol) it is certified that the ship was built according to the agreement
- Operational trials of the main and auxiliary machinery and of the electrical and electronic equipment
- Sea trials designed to prove the characteristics of all the ship's operations through the sea trials, while in dock and during sailing
- The buyer will have the right to supervise the execution of the work in the shipyard, as is provided by the agreement. The manufacturer will also receive permission by the suppliers and sub-contractors permitting the buyer's inspector to inspect the stored or manufactured items or the work executed in the suppliers' or sub-contractors' premises. Such inspection can take place on any working day and time in the factory, workshops or laboratories of the manufacturer and his sub-contractors, where the ships or parts of her will be under construction or trial in their storehouses, where the materials and the accessories are stored. The buyer's inspectors have also the right to attend any

workshop or laboratory where trials are executed by the manufacturer or his sub-contractor and inspect the work and the material, except in restricted areas in the premises of the manufacturer or the sub-contractor

- The inspectors will have the right to reject any material and job if they think that they do not agree with the agreement. It will be the manufacturer's responsibility to assure the buyer that immediate measures have been taken for the settlement. In case that the materials or the manufacturer's work is same or similar to the one of the existing ships, then the inspectors can reject them only if the same actions were taken for existing ships and for the same reasons
- The manufacturer will give all the reasonable accommodation to the buyer's inspector and will ask the same to be done by his suppliers and sub-contractors
- All the inspections and estimations will be held in such a way so the work is not unjustly delayed. Any designs that the manufacturer would submit to the buyer for approval will be returned to the manufacturer with the maker's approval or remarks, if there are any, in twenty (20) days from the date of the submission. If no reply is received during that period, the designs will be considered approved
- The manufacturer will arrange for proper offices and accommodation for the buyer's inspectors inside the premises where the work is executed without any charge, as well as telephone connection for local calls and telex not inferior than to the ones arranged for the manufacturer's own personnel
- The manufacturer will advise the inspectors regarding the availability of materials, which will be ready for the trials in the factory at least one week earlier. The manufacturer will also advise on time in case of

preliminary checkings (in the factory), so that the inspectors will be able to attend. The inspection will start at once and not later than a week from the disbursing of the materials for inspection

- The manufacturer is obliged to give to the inspectors two (2) copies of each sub-contracting agreement, which contain all the terms except for the price and the economic terms. The actions of the buyer's inspectors do not release the manufacturer from his exclusive obligation for satisfactory and timely execution of the agreement. The manufacturer and sub-contractors ought to maintain systems for quality inspections, covering the designing, wherever this is necessary, materials, and productivity and should satisfy the claims included in the quality control
- It is understood that the above systems of quality control will be interpreted according to the systems held in the manufacturer's shipyard and will be completed by the maker's concrete application, being agreed between the buyer and the manufacturer
- The quality control in the suppliers' and sub-contractors' premises, the compliance to the relative specification of material and work being included, will be carried out by the buyer's inspector. Also it will be entrusted, following buyer's applications, to specialized firms of the supplier's or the sub-contractor's country
- The buyer will acknowledge to the manufacturer in three (3) days from the receipt of this agreement, which material and sub-contracting jobs will need supervision by specialized firms. The buyer will apply directly to the said firms and any expenses relative to these inspections will be of the buyer's expense. In all the other cases the buyer will accept the suppliers' or the

sub-contractors' certificates, certifying that the supplied materials or the job agree with their specifications

- The manufacturer will submit a report of work progress to the buyer and an up to date productivity time table of the shipbuilding and the equipment of the ship as well as photos proving the building progress
- The manufacturer, before taking any order for supply of materials and machinery, should have first received the buyer's approval for the technical specifications and for the suitability of the suppliers and sub-contractors to which he plans to give the orders, according to the agreement. It is understood that in case the manufacturer intends to give the order to the same supplier or sub-contractor the buyer will maintain the same administrative and technical requirements. In this case the procedure for the inspector's approval granted by the buyer will not be applied

2. Foreign Industry

Whatever is referred to the procurements from the foreign industries implies some differences from what is implemented in the domestic one.

After the agreement between the two interested parties is approved and signed, the buyer implements a team of officers under the command of a senior officer.

The team includes specialists in mechanical engineering, electronics engineering, shipbuilding, and armor. Also a supply officer, the captain of the ship, and the chief engineer are included.

Their duties consist of three major topics. Economic affairs, close attendance of the construction relative to the shipbuilding, and personnel training.

- Economic Affairs:

The commander of the team carries the responsibility to pay the installments to the manufacturer via the supply officer. If the amount to be paid is above \$100K the bank of Greece authorizes the manufacturer's bank to pay the money. Before this payment is made the team commander has to make a report to the GEN. This report includes verification of shipbuilding progress, according to the contract. In such cases the consultant shipbuilder officer reports to the commanding officer as to what progress been made. However, whenever a modification is needed to the plans proposed either by the manufacturer or by the buyer, the latter party has to pay the difference for the excess amount, or the builder to reduce the amount from what is referred in the contract.

A second responsibility includes the acquisition of the spare parts and the items on board. Since any modifications may imply analogous change in the required items, the specific consultant officer reports to the team leader, who has the authority to accept or, seldom, reject the proposed changes.

The third major duty of the economic affairs has a relationship with the training expenditures. The contractor or the subcontractors make a training schedule in his(their) laboratories for the purpose of providing the required knowledge in the new systems to the buyer's personnel. It is possible for this training to be either included in the contract and hence the money that will be payed is fixed, or to be required by the GEN and so the necessary amount to be under agreement by both sides. Regardless of the scheduled or unscheduled training, the buyer has to pay exchange in order for his personnel to be accustomed with the new installations.

- Shipbuilding Affair :

There is a close cooperation between the specialist officers. Every modification, change or rejection in upcoming installations has to be approved by them. Since they represent the buyer country, they can only advise the GEN via the commanding officer of any modifications that should be made.

- Personnel Training:

This duty rests upon the captain of the ship. Priority is given to the officers training first and secondly to the enlisted personnel. That is why the officers and the chief petty officers are going to constitute the kernel of the unit under construction. For the purpose of achieving his objective the captain separates his personnel into uniform groups based on their duties. In these groups a key officer represents the leader. All the leaders report to the captain so he is well informed about the progress in the education phase. He may decide the extension of the training or the elimination of this time. By the time the training is finished the captain can proceed into the next phase named, "on the job training". This phase is separated into two steps. Both of them are under the captain's control.

- Dock Trials:

They usually last 10 to 20 days and check every system working either alone or in connection with any other subsystems. The captain may decide the proportion of the personnel that has to be on board. However a team of the manufacturer's staff and his technicians is present during these trials for the purpose of verifying the capability of any installed system.

- Sea Trials:

In this final phase the ship's personnel, the team of the country, the representatives of the manufacturer, and a staff of experts are on board. These trials have the purpose to approve the "well done" of the unit as a whole

and to check its operational capability in the real world. For any damages or repairs incurred in this phase the builder carries the responsibility to fix according to the specifications included in the contract. The staff and the enlisted personnel become accustomed to the ship's requirements, and so the country is ready to accept the new unit and to provide it to the fleet.

VII. CONTRACTING PROCEDURES IN THE GREEK NAVY

A. BRANCH E'

The Hellenic contracting department operates under the direction of the fifth branch of the GEN (E' Branch). Its director, who usually carries the rank of commodore, is a supply officer and reports to the A/GEN via the Deputy Chief of GEN. He also has the responsibility to carry out whatever subject is referred to his branch. He commands the supply directorate, the directorate of contracts, the directorate of accounting and budget, and finally the directorate of economic affairs and personnel rights. Figure 7.1 shows the structure of the E' branch of the GEN.

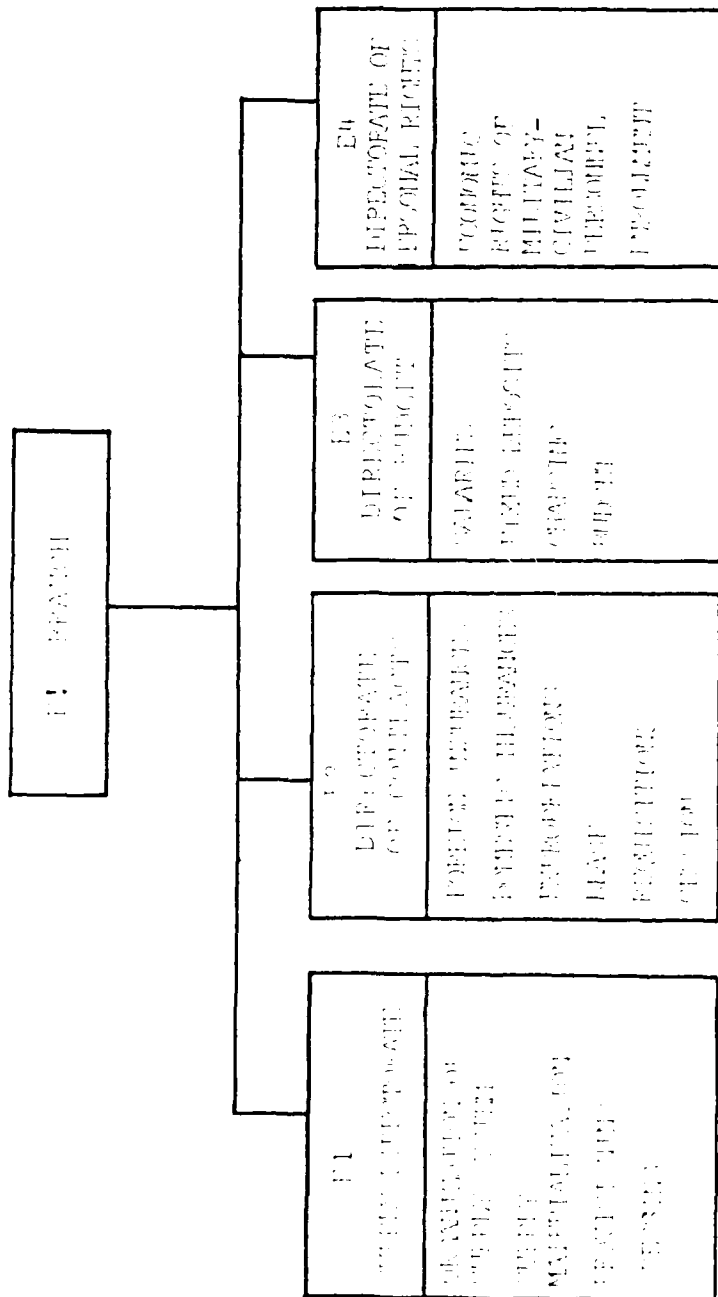


Figure 7.1 E Branch

1. Directorate of Contracts

This division has authority to formalize contracts, to acquire major systems and for the repair of such systems. The transportation and insurance of major systems rests upon the responsibilities of the E' Branch, whether the procurement has been entrusted to foreign or domestic industry. The payment for major systems is included in the duties of this branch.

2. Bids

The specific authorities of branch E' consist of announcing international public bids for procurement, construction, repair, building, and armament of major new systems.

3. Cooperation

The E' branch collaborates with the appropriate divisions for the purpose of evaluating the various bids that are offered from domestic and foreign industries. The main scope of this action is to evaluate all the bids and reject those that do not present an acceptable offerer.

In all cases this branch works together with divisions that develop the description of the detailed requirements for the different systems that constitute a major system (electronic equipment, guns, facilities, mechanical equipment, etc.). This cooperation results in drafting an appropriate list of special terms of agreement for public international bidding. After the acceptance of the contract plan has been made between the contracting directorate and the requiring directorate, the E' Branch introduces the contract for Supreme Council of the Navy for approval. This approval is to proceed into the international competition phase. A copy of the requirement and the descriptions of

various subsystems are sent to the interested bidders as is shown in Figure 7.2 [Ref. 25].

4. Ministry Decision

The E' branch takes into account the fact that in some cases a ministry decision is required for acquiring major systems. That means the decision of the GEN and GEETHA has to be approved by the proper ministries, in order that the procurement be executed.

5. Payments

The above branch has the responsibility of paying the manufacturers via the Bank of Greece to which the branch gives instructions and orders about the exact amount of full payment or installments. That is why it has the authority to communicate with the offerers for matters pertaining the execution of the various steps of the contract, the collection of the different invoices, and the final payments of the expenses [Ref. 26].

B. GENERAL TERMS OF AGREEMENT

1. Existing Policies

The public international competitive bidding follows the rules, procedures, and instructions given by the Presidential Decree 785/1978 that states the procurements and contract works for Armed Forces [Ref. 27].

According to this decree, eligibility to participate in the bidding either personally or through their authorized representative on condition are the persons that have not been excluded by the DEM, by services of the Armed Forces hierarchy authorized by him, or by other competent state Authorities. So the persons that can participate are Greek or foreign citizens who have been exercising a commercial,

NOTIFICATION

1.	COMMERCIAL ATTACHE	BRITISH EMBASSY, ATHENS	(5 copies)
2.	" "	U.S.A. " "	(")
3.	" "	BELGIUM " "	(")
4.	" "	SWEDISH " "	(")
5.	" "	FRENCH " "	(")
6.	" "	W.GERMANY " "	(")
7.	" "	ITALIAN " "	(")
8.	" "	HOLLAND " "	(")
9.	" "	SWITZERLAND" "	(")
10.	NAVAL ATTACHE in	WASHINGTON DC	(")
11.	" " in	LONDON	(")
12.	" " in	PARIS	(")
13.	" " in	ROME	(")
14.	" " in	BONN	(")

Figure 7.2 Announcement

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A COMPARISON OF THE SHIP SYSTEM ACQUISITION PROCESS OF
THE GREEK NAVY AND US NAVY(U) NAVAL POSTGRADUATE SCHOOL
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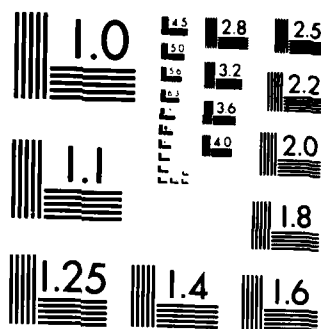
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industrial, or handicraft profession relevant to the subject of procurement either in Greece or in foreign countries during the current year of bidding. Also in this category are included the representatives of the aforesaid natural or legal persons, and the trusts or cooperative associations from those residing in Greece.

The aforementioned participants should provide specific documents pertaining to their eligibility, according to the Greek legislation.

2. Advance Payment

After signing of the relevant contract, an advance payment up to 80 percent of the value of items under procurement can be made to the contractor at the Hellenic Navy's discretion and only in exceptional cases, against a guarantee of equal amount. The above advance payment is effected only in exceptional cases. These cases require the approval of the GEN and only in the event the bidder has requested it in his bid at the time of bidding, where he provides enough data (raw material to be procured, etc) which the advance payment will be based on.

The amount of the advance payment guarantee will be reduced proportionally to the value of each delivery and will be returned after the final delivery. When a supplier is declared as forfeited or the contract is dissolved, he has to return the amount of the advance payment in due time. If the supplier refuses to return this amount, the advance payment guarantee is drawn on plus an amount of an estimated interest with the highest valid proportion of its legal act.

The above interest is computed on the value of undelivered material for the period starting from the date of the advance payment till the date of contract dissolution or the date of declaration of the supplier as forfeited. Similarly beyond the date of the contract breakage or

declaration of the contractor as forfeited and up to the time the advance payment is paid back there is a corresponding interest of time (days). That is estimated with the later valid proportion of legal and time exceeding (days) interest.

3. Unsealing and Evaluation of Bids-Objections

At the date and time fixed for the bidding in a public meeting, the Bidding Committee unseals the bids by priority of receipt recording them in a report. For those bids unsealed untimely and by mistake, a special report, duly justified, is issued by the Committee and these bids are announced first during the bidding.

A bid not covering the terms of agreement and not including the proper guarantee is initially considered as rejectable. The bids and accompanying documents are initialled by the Committee and the certificates are returned to the beneficiaries after they are checked.

The Committee announces to the present bidders the prices and terms of all bidders, as well as the assigned score, any conclusions drawn from the technical appraisal of the material to be procured. Also, it decides on the typical validity or invalidity of each bid according to the importance of any possible deviations stating its opinion in writing in the relevant report.

Bids containing, in the opinion of the Committee, unimportant deviations from the terms of agreements are considered at the Committee's discretion as being in agreement with them. Bids with the same price for the same item of equal quality, quantity, and other characteristics are considered as equivalent. In this case the bidding at the Committee's discretion continues orally among the equal bidders on a report within a reasonable time determined by the Hellenic Navy. The bidding can also be awarded among the

equal bidders at equal proportions or it can be awarded to the bidder drawn by lot in public session.

No appeal for any reason is accepted, unless submitted in writing to the Committee at the time of the bidding. The Committee irrevocably judges and decides on the objections, mentioning the reasons in its report, without postponing or discontinuing the bidding in progress.

4. Exclusion of Bidders from all Procurements of the Armed Forces

By decision of the Chief of the GEETHA, following a justified proposal of the Hellenic Navy General Staff, bidders failing to fulfil their obligations towards the State and proven to be unreliable suppliers may be excluded temporarily or permanently from the list of suppliers of the Armed Forces.

Within fifteen (15) days from the notification of the above decision a written objection may be submitted upon which the DEM will judge and decide.

5. Bidding Award - Notification of Adjudication

Bidding award is subject to approval of the Greek Navy. The bearer of financial authority or jurisdiction to make the awarding decision will judge and decide on the approval and award of said bid.

The bidders are obliged to wait for the issue of the aforesaid decision until the expiration date of their bid. After that they may request in writing to be released of any obligations and their guarantees to be returned to them without any other claim on their part against the Hellenic Armed Forces in regard to their bid.

The notification of bidding award decision as well as all relevant documents to the bidder are considered as lawfully delivered in case that these cannot be handed to

him personally, if these are posted in the offices of the bidding service or at the address where the bidding took place.

6. Declaration of a Supplier as Forfeited, Penalties, Arbitration

In the event the supplier should fail to deliver within the contractual time, the material awarded or the material rejected by the acceptance Committee for replacement, he is declared forfeited by the Service and the following penalties are imposed.

Forfeiture from the bid awarded to him as well as from any right arising out of it.

Forfeiture of the good performance guarantee in favour of the Hellenic Navy Pension Fund. Procurement of the material(s) either through the next lower bidder or through a new invitation to bids or without it. That depends on the requirements of the Hellenic Navy and by charging the forfeited bidder with any extra amount collected either from any amount due to the supplier from the Greek State or according to the provisions for collection of revenues of the State. Also any delay in delivery imposes the application of penalties.

The aforesaid penalties are independent from any other claims of the Hellenic Navy in regard to any positive losses caused to it directly or indirectly by refusal of the supplier to implement timely the adjudication procurement to him. The Hellenic Navy may accept a delayed delivery but imposes the various fines calculated on the value of the total delayed delivery. That can be established regardless of delay duration and of the value of the delayed material which, although delivered, cannot be used because of the delayed part.

If the supplier does not agree with the decision of the acceptance Committee, for the total or partial rejection of the contract material, or for a reduction of the contractual price, he has the right to ask for the application of the arbitration clauses within two days from the signing of the rejection protocol. In case that the members of the Acceptance Committee do not come to an agreement in regard to aforementioned disputes then the decision on arbitration will be taken by the bearer of the financial authority or jurisdiction.

7. Exception from Penalties - Force Majeure.

No penalties are imposed to the supplier in case force majeure is ascertained on account of which an inability to deliver the material within the contractual time was caused. The burden of proving force majeure lies upon the supplier. Cases of force majeure as considered indicatively as general or partial strike entailing interruption of the works of the supplier's firm or factory, fire in the supplier's firm or factory, flood, earthquake, war, electrical power cut-off and lock out following an approval of manufacturer's associations.

The aforesaid cases of force majeure must be reported by the supplier to the Hellenic Navy in writing within two (2) days from the time they occur or in case they last long from the day they cease to exist by the Contractor. This should be certified by a competent Authority of the supplier's country. In case that the material is procured from abroad the said force majeure should be reported within ten (10) days.

VIII. ACQUISITION PROCESS. COMPARISON BETWEEN US NAVY AND GREEK NAVY

A. SIMILARITIES-DIFFERENCES

Any existing similarities between the two systems as far as they concern the ship acquisition process can be summarized in the following areas: the mission need determination and threat assessment, the procedures established for the system to be acquired, and the concern for the cost of the system and its deployment.

However, any existing similarities may also include differences in matters pertaining to specific procedures based on the detailed and written rules followed by the U.S. Navy. Thanks to the strong economic system, the huge strategic force, the specialization in all the professions and the strongest industrial base, the U.S. has to face only one major problem. That is its security and the strength of the NATO alliance.

1. Mission Need Determination-Threat Assessment

The U.S. Navy identifies a security threat, either by actual events or by their prediction, relative to the day by day improvements in high quality weapon systems. The scope of these predictions represents not only insurance for itself but also constitutes a protection for every country in the NATO alliance. But the major factor remains the one that has been established by the Congress and it consists of the recognizing of a continuing need for international defense cooperation for the purpose of implementing peace and security in every place.

The U.S. has to spend a large amount of dollars every year in completing their needs either in weapon systems or technology base programs. However their declaration remains as how to be a part of a world free from burdens and the variety of dangerous conditions coming from the armaments. So they subordinate the use of force to the rule of law. Figure 8.1 shows the funding for strategic defense for the years 1984-1989 [Ref. 37].

The U.S., also trying to limit the intensity of a conflict, has to be able to be protected from an attack and to restore the peace. A major factor remains as how U.S. can face the conflict by using such forces to stop rather than to extend the war.

Greece, on the same side, uses a similar strategic concept. The Navy has to protect the nation's property and to support the alliance in that area. SECDEF in the Annual Report to the Congress for the fiscal year 1985 states that the security of the U.S. is inextricably linked to the independence of the democracies of Western Europe. In recognizing this fact and the threat, the U.S. has joined with fourteen European nations and Canada in the collective defense alliance. In peacetime, the United States stations ground and air forces in Europe and deploys naval forces in the Atlantic and Mediterranean [Ref. 36].

Additionally the current Greek view places peace as the primary value, thus the focus is more on how her policy may establish peace and less on the military requirements for maintaining security. But given the widely considered excess of military power in the world, the support for defense spending is gradually eroding. That forces the country to implement criteria as far as the priorities of the major weapon systems necessary to be acquired in order for the nation be protected.

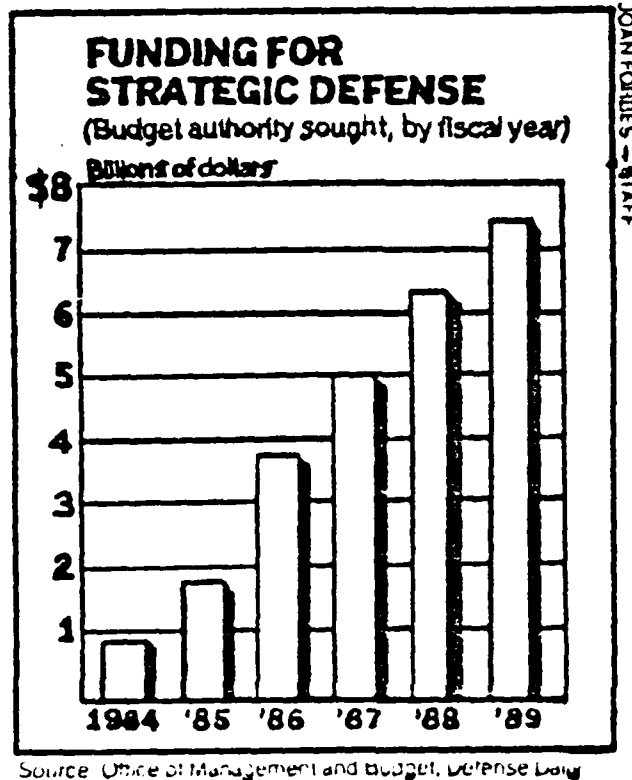


Figure 8.1 Funding for Strategic Defense

2. Rely on the Private Industry

The acquisition of major weapon systems in the U.S. Navy implements the requirements of circulars A-109 and A-76. Both state that the government has to rely upon the participation of the private industry for non-governmental

activities, for the purpose of exploiting its resources. The famous economist, Professor John Kenneth Galbraith, expressed his opinion that these industries are already public since the major proportion of their capital was funded by the government, and their products were not price competitive. Finally he states that even when the industries made faults and failed to achieve the required performance the government sustains them [Ref. 5].

The same strategy is implemented by the Greek legislation. The law 1262 of the year 1983 establishes investment incentives to encourage industry to locate their activities in regions near the borders of the country and in some cases, far away from Athens. Also it establishes the same incentives in order to encourage them to construct major systems, high technology products, and importation of computer technology. In one of these industries, the Fast Patrol Boats were constructed by Greek personnel, supervising all the specific stages in these shipbuildings.

3. Decision Makers

In the U.S. Navy the final decision concerning the proposed system rests upon the SECDEF. Therefore, after the SECDEF's approval he continues to control the major weapon system until its provision to the operating forces with one exception. He will not delegate his authority to the SECNAV for the program to proceed into the phase Production and Deployment (Milestone III), when the established thresholds in milestone II have been breached.

In the Greek acquisition process the DEM gives the final approval by introducing the program to the KYSEA. On the other side the A/GEN is responsible to carry out the whole program by giving his instructions to the team responsible for acquiring the system. The teams report to the A/GEN via their commanding officers, for whatever applies to

the schedule or its modifications in constructing the ship and in the area of logistics support.

4. Plan for the Acquisition of Major Systems

During the Concept Exploration phase two significant activities are established. The Acquisition Strategy and the Program Manager. Both are strictly related since the PM has to implement the acquisition strategy in every stage of the shipbuilding. This strategy represents an overall plan through which a program for carrying out a weapon system should be followed until the major system is provided to the fleet or other operating forces. This concept may also include assistance and advice given by experts in the same area, since the acquisition strategy in many cases is unique for each program. On the other side the PM is the only responsible person to carry out the whole program by following either the charter or experimental events of the real world. He is also responsible for research, development, evaluation, procurement and deployment and generally for an effective overall management for a specific weapon system [Ref. 38].

Additionally the PM carries the authority and responsibility to be present and to inform the appropriate committee of the Congress for whatever applies to a specific program as far as the spent money [Ref. 39].

As far as the Greek Navy concerns, neither the acquisition strategy nor the establishment of the PM are clearly defined. The country's responsibility is limited to the overall management of the specific weapon system that is going to be acquired. That means the team responsible to acquire the major weapon system can give his proposals to the manufacturer for any modifications, without having the authority to alter any subunits included in the contract. This authority rests upon the GEN.

5. CFNAV-NAVMAT and GEN-FLEET HEADQUARTERS

In the U.S. Navy, the user is represented by the Office of Chief of Naval Operations and the producer by the Chief of Naval Material. The latter works for the OPNAV in order to provide the fleet with the best weapon systems. SECDEF's opinion in this position is that the U.S. not only must expand the forces of the ships to meet the worldwide commitments of the U.S. forward defense strategy but also they must upgrade the quality of their forces. Countering the future threat requires that the U.S. forces use the resources in more innovative and efficient ways.

The similar concept also exists in the Greek Navy. It focuses its attention on the fleet. The major proportion of the needs take into account the necessities for the ships being in operation.

6. Milestones

The four milestones and the five phases in U.S. Navy are clearly defined in such a way as to thoroughly inspect the cost, schedule, research, thresholds, and operational analysis. Greece does not have clearly defined phases and also the cost and schedule are included in the contract and represent constraints that are implemented after the agreement with the manufacturer.

7. Biddings

The U.S. Navy acts based on the completion within the domestic industry considering factors such as cost, schedule, strengthening the industrial base, and performance. Additionally the small business office in NAVSEA acts as protector of the small industries (those having less than 1000 employees) trying to exploit their resources.

Precisely in this point the SECDEF's opinion and position has to be noticed. In the annual report to the Congress for fiscal year 1985 he states that within the last few months the DOD has instituted a sweeping acquisition improvement program that comprised 32 major initiatives to bring good business sense to defense procurement. Also DOD, in order to correct long standing inefficiencies, has taken measures to budget more realistically for future acquisitions, to encourage more competition, to produce equipment at more efficient rates, and to infuse greater stability into defense contracting.

Greece does not have this flexibility since the country has to rely on the foreign industry, trying to find the exact major weapon system that could meet the optimum cost and the operational requirements. This event causes the country to suffer by the large expenditures summarized in billions of drachmae.

8. Weapons System Modifications

The PM has authority to implement any changes that he decides useful and necessary in every stage of the construction of a ship. He acts independently within the constraints of the thresholds and has a direct communication with the NAVMAT or the commander of the SYSCOM to whom he reports for matters pertaining to every phase and problem of the major weapon system. Also he is thoroughly supported by the contracting officer (CO) who represents him in contractual situations.

The PM in Greek acquisition process is not exactly defined. This concept is represented by the leader and the specialists (Officers) in the team under his command. They have limited authorities to propose modifications since for any major decisions they have to make relative reports to the GEN to which these decisions depend on. In such cases

actions relate to the law and legislative documentation, he has to be an Officer of the E' branch of the GEN carrying the indispensable knowledge surrounding the broad area of the laws, decrees, methods, and instructions. Working with his team the CO prepares the RP and sends them to the interested parties. The solicitation of the bids are evaluated subject to such criteria such as cost, performance, and the time to be acquired. As it was described in chapter VII, section B, pertaining to the procedure for unsealing and evaluating the bids, the specific committee may agree to accept bids containing unimportant deviations from the terms of the agreement. So the acceptance of the bids depends on the Committee's discretion, given decision responsibility established for the CO. He also estimates the necessary level of the budget that will be required for the completion of the whole program. Both of them, the budget and acceptance have to include an inherent flexibility that allows a closed approach to the considered need.

The completion of these specifications needs the cooperation of all teams. Under the supervision of the PM supported by the CO, the members collaborate in order to prepare compromise written descriptions. The result is a finished set of required Technical and Operational Requirements Descriptions (T&ORD) and an evaluation of the bids of the offerers.

The Introductory Memorandum is submitted to the KYSEA via the A/GEN attached to the work done by the teams. Approval of the governmental council gives the "green light" for the program to enter into the stage 4 as it can be seen in figure 9.5.

work for the establishment of the actions chain, including Technical/Operational Requirements Descriptions and Requests for Proposals.

1. Technical/Operational Requirements Descriptions

Since the approval of the Governmental Council of National Defense has been given, the program can enter into the most critical stage. Teams of expert Officers and knowledgeable civilians prepare a first description of the required technical specifications. The PM coordinates these teams and carries the final responsibility for the execution of this process. Experience from other similar major weapon systems can be applied to the fulfillment of this step. Additional information can support the expert opinions. Technical manuals (if available) can help in the final break-down of all the necessary details. Another team is constructed to describe the specifications in the area of Logistics support. A third team is for the establishment of mechanical requirements and so on. The operational capabilities on the other side are strictly related to the technical specifications. These capabilities relate to the mission for which the system is required. There will also be a description of preferred systems and subsystems and a closer designation of the cost and life cycle cost considerations.

2. Request for Proposals (RP)

The above responsibility rests upon the Contracting Officer. He works in parallel with the PM, carrying the responsibilities as these are described in the above section A. In this specific stage he has the authority to search international and domestic industry to acquire a first appraisal of the possible offerers for the specific major system. He may construct a list of the firms. Since these

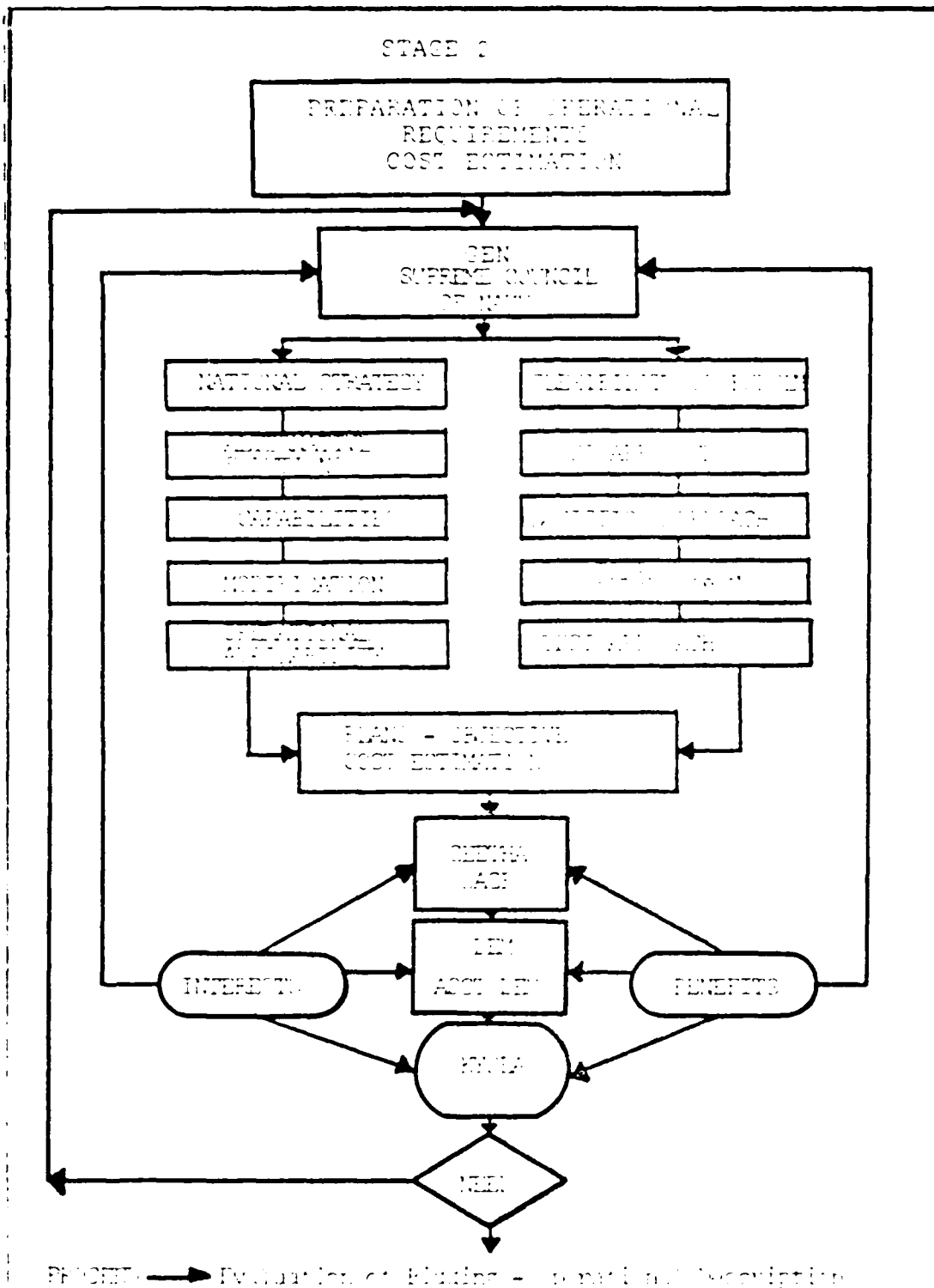


Figure 9.4 Oper. Requirements & Cost Estimation

flexibility. The selection of the most promising concepts is inspected and causes an outline description from the PM and his staff. The E' Branch prepares the international competitive biddings. The C' Branch, responsible for Logistics support in cooperation with the D' Branch, responsible for mechanical, electrical and electronic systems of the ship, will estimate the required items to support the system. Also their suggestions may include required operational availability and maintainability based on previous experience.

The above appraisals are meaningful for a relative approach, since it is impossible for details to be established before relative tests take place. A greater estimation in these predictions (including deviations) could help the required total amount that the buyer would owe for acquiring the system.

The introductory memorandum is then submitted to the Supreme Council of Navy for approval. This Council carries the authority to make changes, improvements in the variety of the requirements, or to reduce these factors, having in mind the needs, interests, and benefits for the Country. Approval of this Council constitutes the submission of the IM to the KYSEA via GEETHA/SAGE and DEM, in order for the program to proceed into the next stage. Figure 9.4 shows the procedures until the decision point 2.

C. STAGE 3, EVALUATION OF BIDDING-OPERATIONAL DESCRIPTION

DECISION POINT 3

This stage includes a wide spectrum of activities. Some of them take place domestically concurrently with the foreign industries. Critical considerations have to be made starting from the description of specific operational requirements. The PM implements his authority to coordinate the teams that

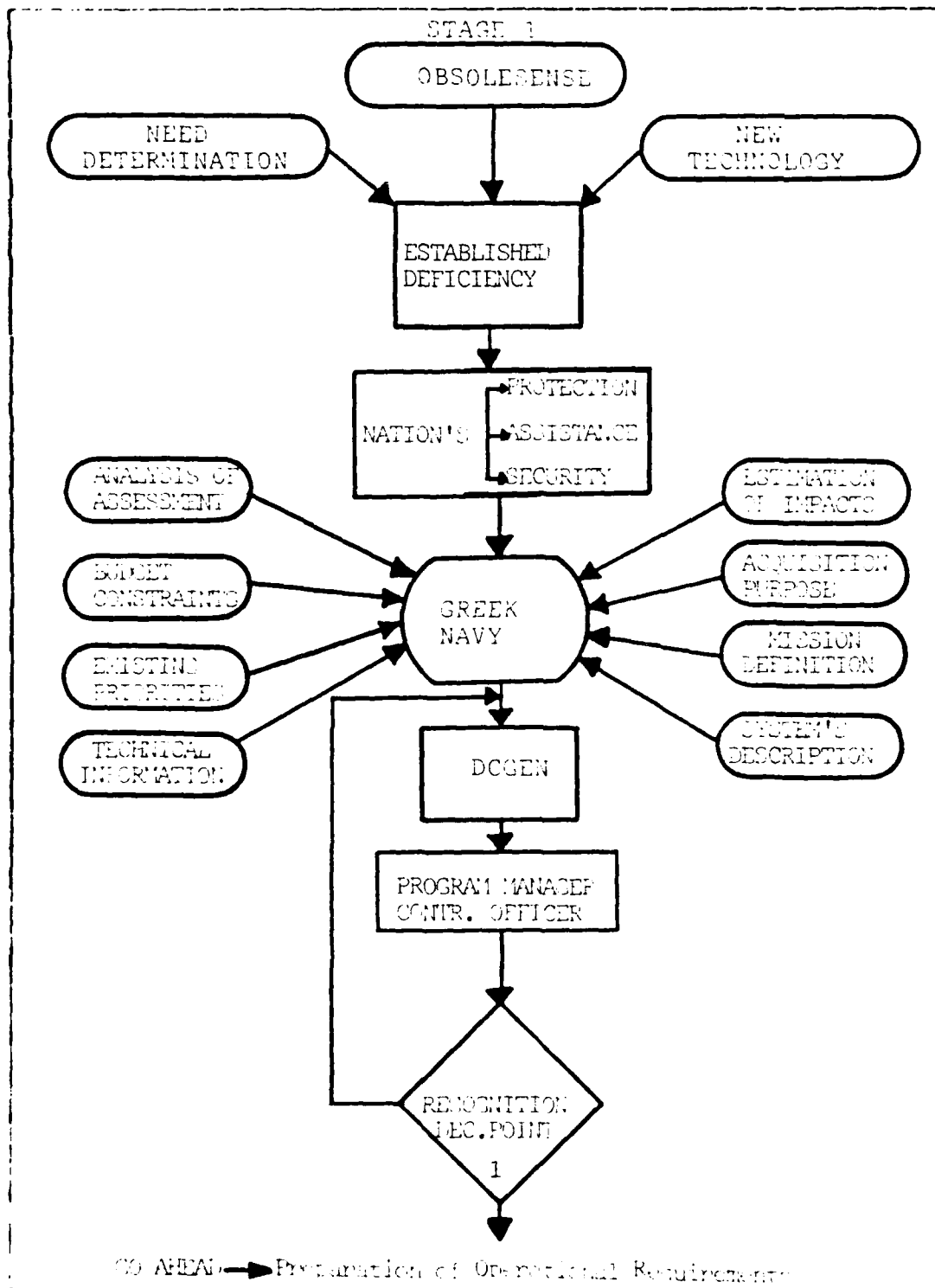


Figure 9.3 Recognition-Decision Point 1

TABLE 3
Industry Program Managers

Industry Project Manager	Formal Education	Years of Training in Busin. or Indus. Practices	Years in Current Business Activities	Years Worked in Com. vs DOD Projects
1	B.S. Mech. Engin.	0	14	4
2	B.S. Mech. Engin.	0	40	31
3	B.S. Elec. Engin.	0	15	15
4	B.S. Elec. Engin. B.S. Physics	0	14	11
5	B.S. Math & Engn.	0	24	24
6	B.S. Engineering	Exec. mnmt training	16	16
7	Product Design Courses	Co. spon. mgmt. course	12	12
8	B.S. Elec. Engin.	Co. AMP course	15	15
9	B.S. Mech. Engin. Commercial Science	1	12	12
10	B.S. Elec. Engin.	0	21	21
11	B.S. Elec. Engin.	0	19	19
12	Math/Chemistry	0	19	19
13	B.S. Engineering	0	20	20
14	B.S. Elec. Engin.	0	17	17
15	B.S. Mech. Engin.	Co. spon mgmt. course	16	16

must be analyzed in order to cover both the present need and the future plans and objectives. The provision of capabilities are needed to support the independence and stability in the Nation's region. The modifications of the existing systems are finalized through the budget guidance and

TABLE 2
Government Program Managers

Government Project Managers	Formal Education	Training years in Business or Ind. Practices	Years with Proc or PM
1	B.S. Service Academy B.S. in Physics	0	1
2	B.S. Academic B.S. Mech. Engineering	0	2
3	B.S. Service Academy-MBA	1	1
4	B.S.-MEA	1	1
5	B.S. Mil. Engineering M.S. Civil Engineering	0	4
6	M.S. Civil Engineering B.S. Mil. Science	0	4
7	B.S. Service Academy M.S. Elec. Engineering	0	1
8	B.S. Mil. Science M.S. Elec. Engineering M.S. Ind. Engineering	1	2.5
9	B.S. Bus. Administration M.S. Log. Management	4	2
10	B.S. Service Academy MBA	1	1
11	B.S. Mil. Science MSE Mech. Engineering	1	2.5
12	B.S. Mil. Science	1	3
13	B.S. Mining Engineering MBA	2	1
14	B.S. Engineering M.S. Engineering	1	3
15	B.S. Physics M.S. Elec. Engineering	0	4

parallel with the main objective (optimum system, lower cost). The proposed solutions are evaluated due to their improved versions (if any). The operational requirements

In the following two tables (table 2 and table 3) the results of a survey are indicated of a sample constituted of 30 PMS, of whom 15 were employed by the DOD and 15 by private industry. As far as the government PMS concern, fourteen of them had one year or less of formal training in the fields of procurement, contract administration, and/or industrial management. The fifteenth PM had four years of training in these fields. Seven of the 15 PMS had been involved for two years or less with some segment of private industry. Most of this contact had occurred during their current assignments. Five PMS had between two and three years contact with industry. Finally, three of them had four years' experience with industry.

On the other side all fifteen industry PMS had received formal education in engineering. Only five of them had any formal training in business administration. Four of these five had attended short company-sponsored courses in advanced management training. The experience level of industry PMS ranged from 12 to 40 years, with an average of 18 years. While statistics indicated that government PMS had more formal education than their industry counterparts, not one government PM had worked one-third as long in program management as any industry manager [Ref. 5].

At the point where the DCGEN gives his approval the first decision has been made and this represents the Decision Point 1 as it is indicated in figure 9.3.

B. STAGE 2, OPERATIONAL REQUIREMENTS AND COST ESTIMATION

DECISION POINT 2

This stage represents a critical step in the whole acquisition process. Essential elements have to be taken into account in order to meet the national strategy. During this stage alternative solutions are conceptualized in

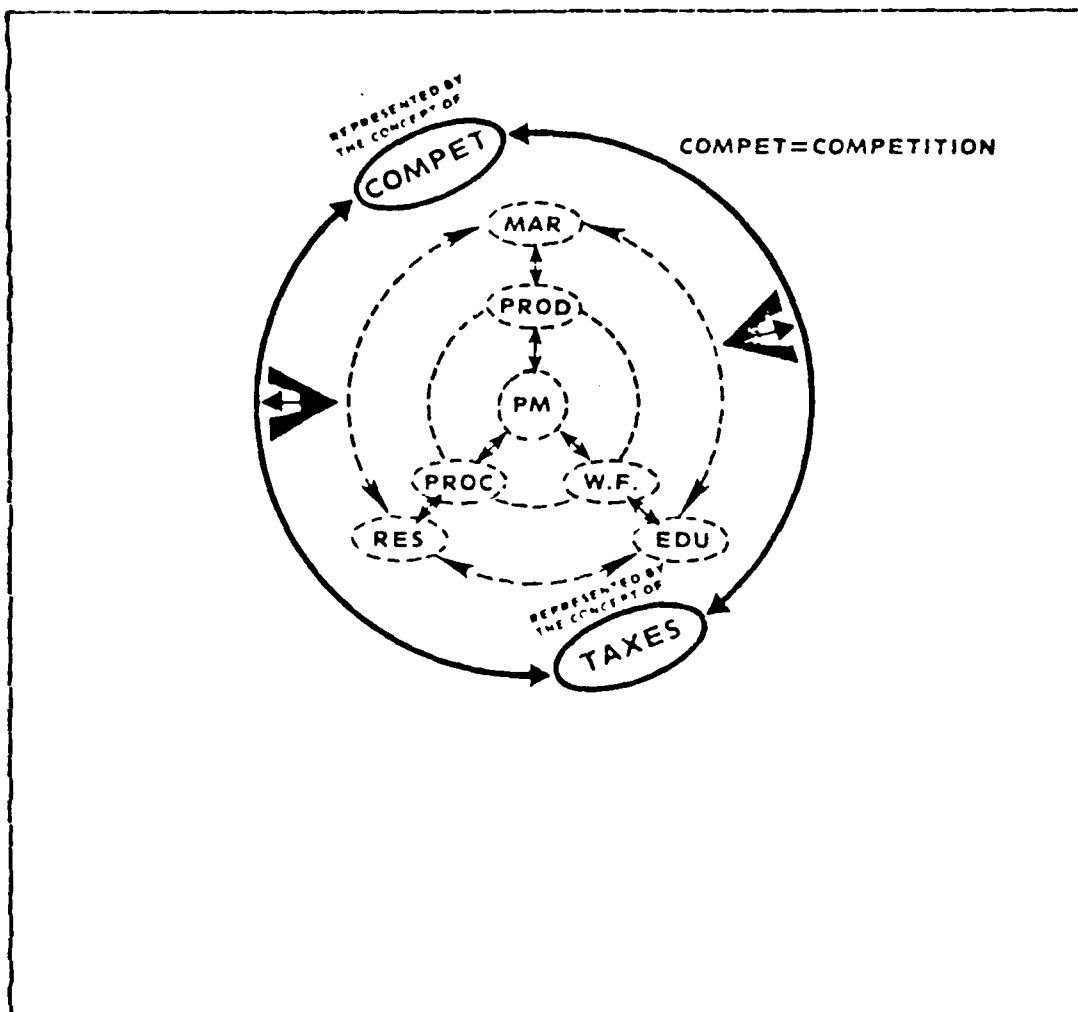


Figure 9.2 The Non-Measurable Environment

involved costs, technical performance, and established schedules

- Evaluation of proposals for extended overtime and multishift work for the final approval of the PM
- Analyses of the received various reports, overhead negotiations, property administration, and an overall assistance to the Program Manager

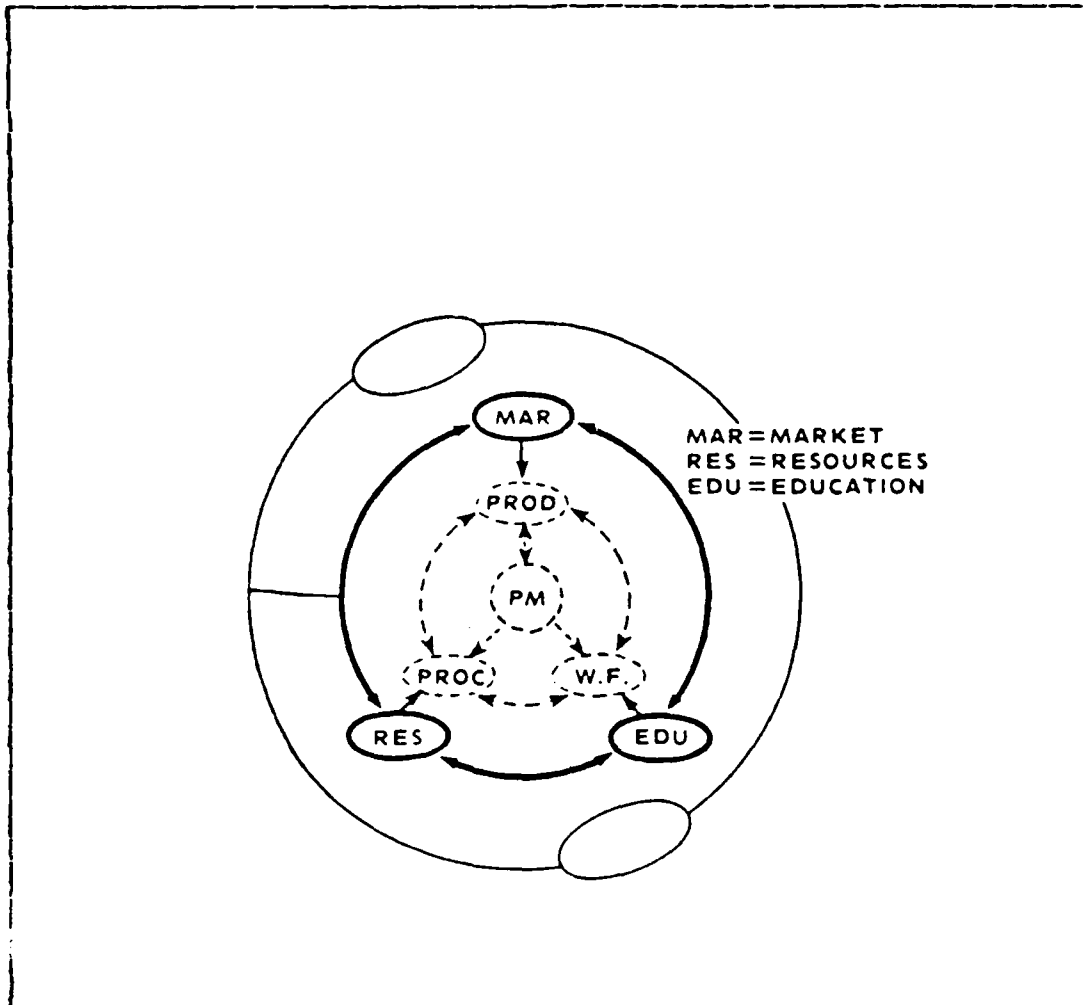


Figure 9.1 The Measurable Environment for a System

As far as the Contracting Officer is concerned, the following tasks normally fall within his provinces:

- Contract Administration, while the main supervisor remains the Program Manager
- Approval of subcontract terms, condition, and costs for compliance with prescribed make-or-buy decisions
- Preparation of field analyses of contract-change proposals and the impact that may have upon the various

same branch, as it is done at the present time, can appraise everything related to the above key factors, such as analyses of assessments, constraints due to limited resources (budget), the priorities and the required operational capabilities. Factors such as technical information, mission definition, purpose for which it has to be acquired, and impact upon any other existing major programs should be estimated. All the notifications, descriptions and reasons due to which a major system should be acquired might be included in the introductory memorandum. This memorandum carried a "recognition" of the existing deficiency, is submitted to the DCGEN requiring relative approval for an appropriate action. The DCGEN has the authority to approve, disapprove, or cancel this document and to inform the high level decision makers by submitting a summary of the received paper. When the approval is given, it has the meaning for the requirement to proceed into the next stage. The DCGEN authorizes the establishment of the PM and the Contracting Officer (CO). The idea of the establishment of both the PM and CO in this stage is to become familiar with the wide spectrum of discussions and to be involved in useful details surrounding the major program, because expert officers are going to discuss the subjects related to the weapon systems.

In figure 9.1 the measurable environment is indicated for the PM, being in the center of the cycle that represents the various elements involved in the system acquisition process. Also figure 9.2 shows the non measurable environment for the same purpose for the same person [Ref. 40].

The duties of the PM and CO have to be written and clarified in a similar way as in the U.S. Navy. The PM will report directly to the C' Branch of the GEN (Logistics-Budget coordination), to the DCGEN, or to the A/GEN via the DCGEN.

IX. PROPOSED POLICY/PLAN FOR THE GREEK NAVY

This chapter includes two parts. The first one represents an attempt to establish a policy of acquiring major weapon systems for the Navy. The second includes proposals for procedures that could carry out this policy. The motivation is strictly related to the establishment of the above procedures for the purpose of improving the existing acquisition process for major defense systems in the Greek environment.

The objective of this thesis remains that of providing assistance to the managers of the acquisition process, by making proposals covering the entire role of the programs and to help improve methods necessary to carry out a whole program. It must be said that the proposed policy can be implemented if the lack of the industrial base in the defense industry does not represent a problem and so this industry necessitates changes, technology base programs, and transfusion of this technology into domestic areas. A suitable and step-by-step strategy must be established through which the above three factors would lead to the strengthening of the appropriate manufacturing industries.

Four decisions and five stages are the main concepts surrounding the whole acquisition process.

A. STAGE 1, RECOGNITION

DECISION POINT 1

This stage includes three major considerations necessary for the implementation of the beginning of the chain of the procedures. They are the Existing Need Determination, the Obsolescence of Existing System, and the New Technology. The

The technology base programs absorb money regardless of their output. The research centers are financed by the government and the private sector. The U.S., in trying to stay as the leader of the western world, spends a great amount of their resources for Defense Programs and for giving aid to other countries. Greece, with its limited resources and the lack of the necessary industrial base, is forced to deploy the systems from international industry. Progress has been made in this area and it seems that the adequate combination of the advanced (existing) scientific personnel and the shipbuilders could lead the country to develop the indispensable motivations.

11. Proposed Acquisition Process

Up to this point a detailed description of the acquisition process has been made for the U.S. Navy and the Greek Navy. Also similarities and differences existing in the two systems have been described. The following chapter will provide a proposed policy/plan, and in the final one an attempt will be made to show how this policy/plan could be established.

the manufacturer has to agree with the submitted changes of the buyer, since these are not included in the contract between the interested parties.

9. Logistics

Logistics support is defined in the early stages of the acquisition process in U.S. Navy and is accelerated in the Full Scale Development Phase. A detailed examination of the necessary items in the appropriate quantity is refined. That results in the preparation of the Integrated Logistics Support before the ship is entered in the operational forces.

In the Greek procedures the spare-repair parts, special tools and equipment devices are included in the contract and in many cases in the recommendation lists that are provided by the manufacturer. The country firstly may accept all the recommended support equipments. But secondly it can inspect all the written spare-repair parts needed for the ship. In such cases the appropriate services GEN-Fleet Headquarters- Logistics-Administration Command and Naval Supply Center make up their minds concerning the exact quantity of every item that should be either on the ship or in the bases (NSC in U.S.). Also a situation may exist that the prices for the spare parts of one ship may far exceed the prices of the same items of a previous (same type) warship. These unusual conditions may arise either because of the inflation or the higher wage rate or in any other situations. Regardless of the above conditions the country has to pay a lot of money or to pay the manufacturer with other products.

10. Production and Deployment

The U.S. has at its disposal a huge industrial base. Every major system is developed in the domestic industry.

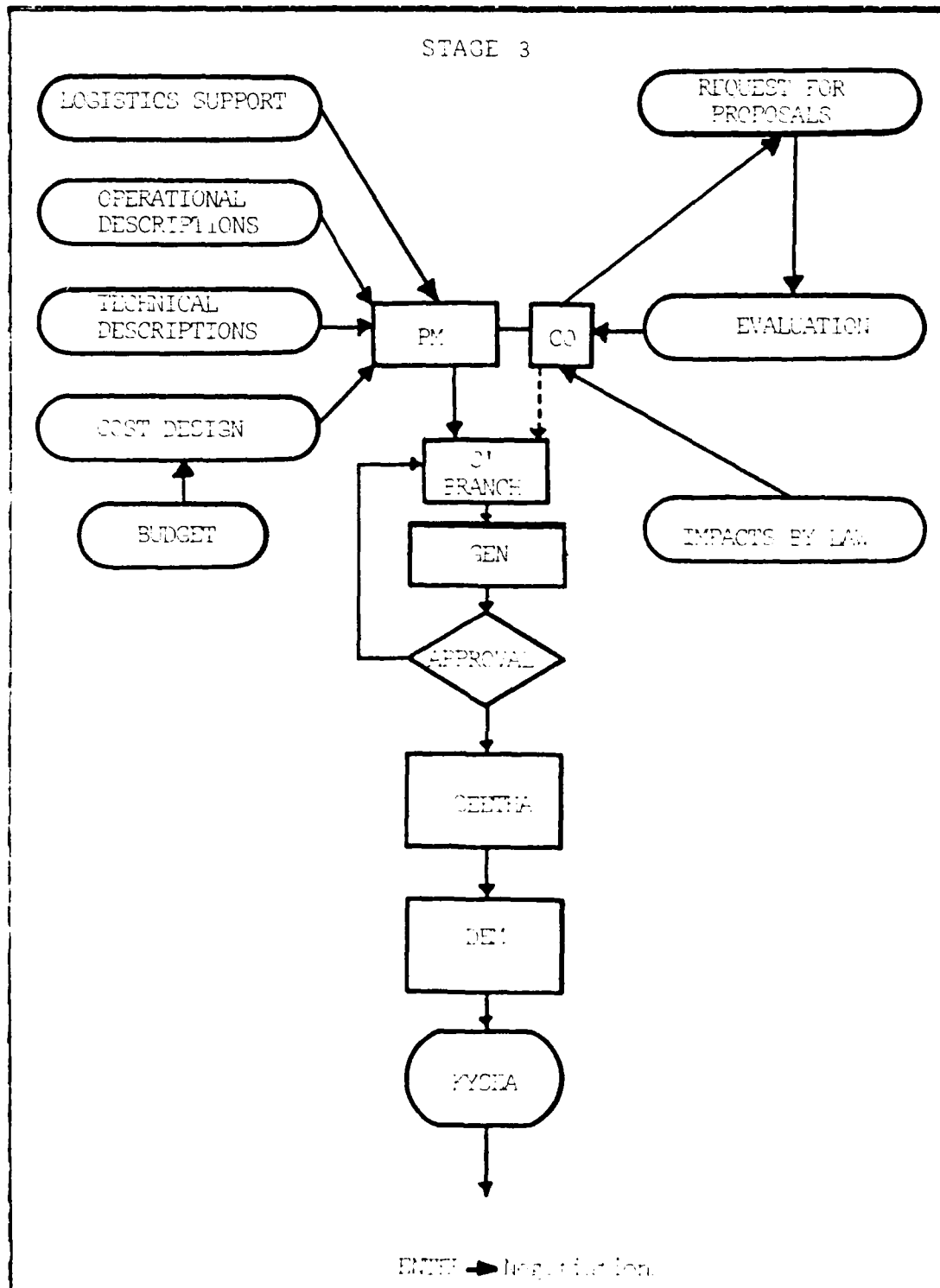


Figure 9.5 Evaluation & Description-Decision Point 3

D. STAGE 4, NEGOTIATIONS

DECISION POINT 4

Actions until this stage include general and specific details inherent in the required system. Stage 4 is focused on major considerations rather than on analysing complex conditions surrounding the new ship. The PM, the CO, and the consultants working with them make a first approach to clarify the international market, the behavior of the manufacturers, and the proportion that they can achieve in reaching the concrete need. The above considerations result from a sequence of negotiations. At this point the evaluation of the bids has been done and consequently efforts are directed toward estimating the cost, schedule, performance, method of payment and all the factors as they are listed thereafter.

1. Cost-Schedule-Performance-Observations

The bids are narrowed to those that approach the cost and the optimum operational requirements, so the CO has to negotiate with the interested parties. Subjects of these negotiations may be details about the cost arising from the construction of the new unit. The Committee of Cost Estimation (COCE), similar to the Cost Acquisition Improvement Group existing in the U.S. Navy, becomes responsible for this part of the whole program, reporting to the PM. Inflation rates in the manufacturer's country, political stability, labor unions, and intergovernmental relationships have to be measured by the buyer. There are potential reasons for little progress in the program, and delay in its acceptance, which imply increases in the above factors (cost, schedule). Later on these deficiencies may result in the weapon system performance reduction. The buyer wishes to acquire the system in the proper time from the proper

contractor and subcontractors, defalcations known or unknown in the industrial market cause losses in the buying power. Therefore the party that requires the system has to be flexible. Any given indemnification from the manufacturer does not solve the time constraints. The technology is growing rapidly and the updated new system may become obsolete as a whole unit or in part. Also it is possible that restrictions may be involved in the whole procedure due to the law. The CO's action of negotiating the cost is similar to the procedure followed by the U.S. Navy Best and Final Offer.

2. Method of Payment

The method of payment and the required installments are also under negotiation. The country having limited resources has to negotiate the exact amount of payment other than the net exchange. The international trade-offs establish different ways to pay its obligations. Economies in the growing stage may not have the flexibility to make full payment in a specific currency.

3. Visits to Labs and Plant

The visits to the manufacturer's base carry the responsibility for the visitors to acquire a first appraisal of the industry that represents a possible offerer rather than to inspect the bidder. The same concept is sought by the observation of the labs and the whole shipyard and the equipments. The PM monitors the above actions supported by expert and essential personnel. He has to examine conditions that could generate problems as far as the industrial capability of the shipbuilder's plant. Any unusual existing situations have to be taken into account because they may create critical problems in the selection of this or another shipyard. In this way the configuration of the proper

shipbuilder would be established and the confirmation of his production readiness could be verified. Technical documents are validated, the mission area analysis is updated, and the logistics support planning is completed. Both the PM and the CO reevaluate the risk involved in their final decision as to where they can obtain the system being under construction.

4. Work Forces

Work forces, work packages, and pre-planned work organization must be developed by the PM. The work forces refer to the responsibility of the PM to select the appropriate personnel and the supervisors for the purpose of carrying on efficiently and effectively. Since there is a distinction between 'doing right things' and 'doing the things right' the selected staff is supposed to be knowledgeable and, if possible, have previous experience. The cost account manager responsible for the work packages (tiny works representing lower levels) must be assigned in order to become familiar with the subject with which he will be involved. The cost performance report represents a tool for the PM to manage and this can be developed by the planning packages (comprehensive packages of work packages). The officer or civilian PM depends on the work forces, under him and their backgrounds. The preferable organizational structure for these forces to be selected from the matrix, functional, and coordinative is the first one (author's perception). The establishment of this structure implies advantages such as using efficiently the workers and the employees, flexibility of the work's change, easy set-up, synergistic environment, and finally it is not terribly expensive. Generally speaking, the PM has to organize his "headquarter" in such a way as for everybody to know who is responsible for what and to what degree.

So far, the establishment of some major considerations have been developed from both the buyer's and the manufacturer's point of view. Cost, performance, schedule, and operational capabilities have been defined according to the relative requirements. Also, procedures for bid evaluation resulted in the isolation of the specific manufacturer who wants and is capable of constructing the system. Support items, special tools, and equipments are refined. The PM created a pre-planned organization structure for the necessary working personnel. The remaining part covers the final stage. Before the program enters into the last stage, a major decision is needed. The KYSEA has been involved in all the decisions until this point, because its members are ministers of critical ministries, so they can appraise more precisely the coordination of the various impacts of a major decision. Likewise the final decision in this point has to be given by the KYSEA, as figure 9.6 indicates.

E. STAGE 5, SHIPBUILDING

After the final approval, the A/GEN monitors everything related to the program. He has a direct communication with the PM and CO. They also may report to the A/GEN via the director of the C' branch of the GEN. Duties and responsibilities carried by the PM include limited production for operational use and tests surrounding the operational suitability. The logistics support is finalized through the gradually acquired experience and the monitoring of quality. Any inefficiencies coming to the PM are resolved and modifications that have to be made are proposed to the manufacturer in order to have a common agreement as far as the upcoming costs and schedule changes. The final product (new unit) is provided to the fleet or another command to proceed into the operational forces.

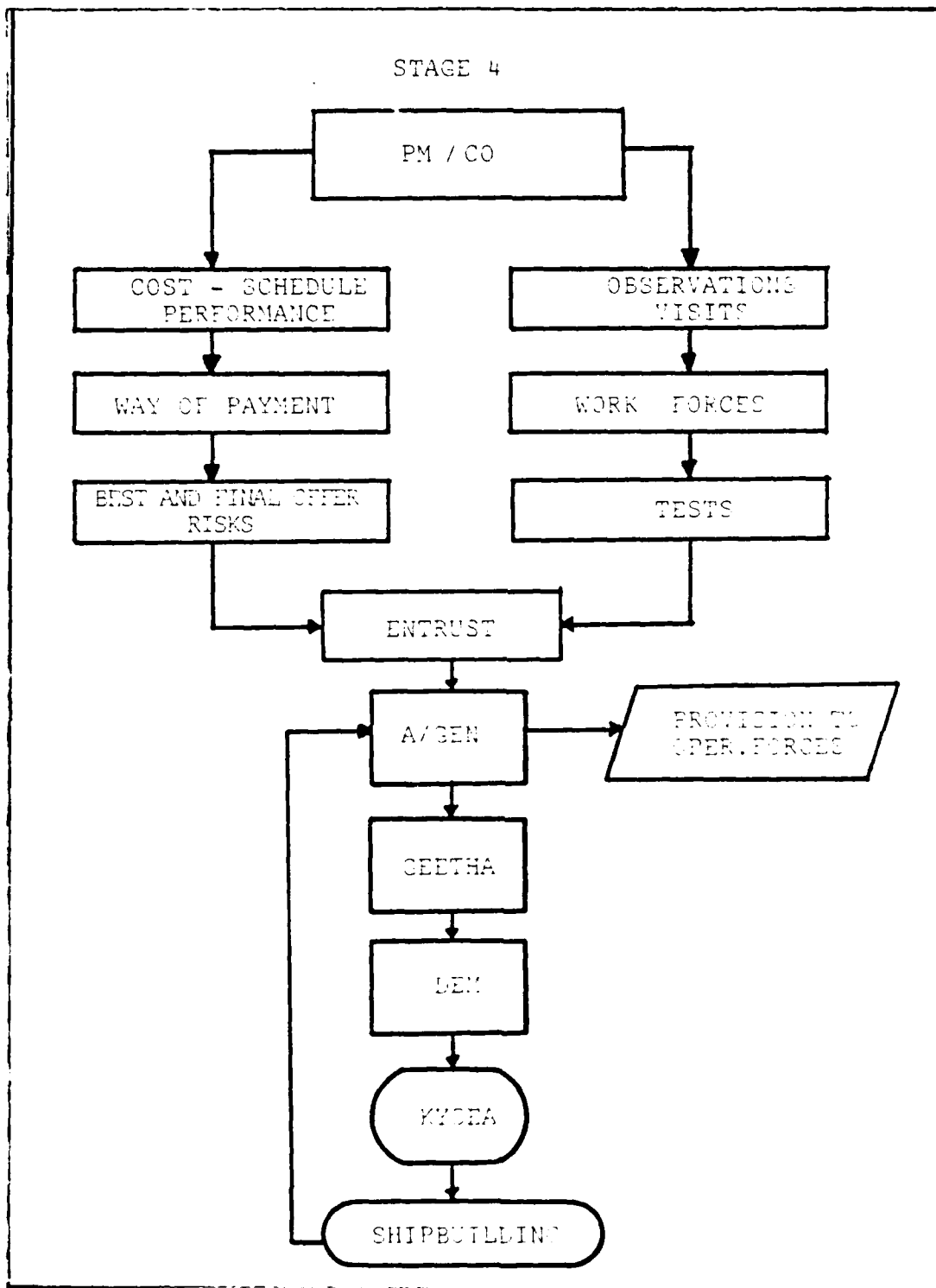


Figure 9.6 Negotiations-Decision Point 4

X. CONCLUSIONS-RECOMMENDATIONS

A. SUMMARY

Each program recommended by the Greek Navy probably is going to be approved by the Government. On the other side the contractors do not hesitate to express their optimism about the performance of the program related to the system. The military officers who are assigned to manage a program may not have experience to negotiate with the manufacturer in comparison with the industrial contractors, but they feel that their duties are tied to the country's interests. The main objective of every non public organization remains profit. So the commanding officer's responsibility is doubled since he and the teams under his command have to understand the overall construction of the ship and, simultaneously, the workings of the private sector.

It has been noted that in the country's history many political and strategic changes have been made. These changes also had effects in the economic, social, military, and regional fields. Also an attempt was made to provide a distinction between the two systems of the Greek Navy and the U.S. Navy concerning procedures, rules, and instructions for the acquisition of major weapon systems.

The author's perception is that the existing similarities and differences depend first on the different environments under which each system operates and secondly on the general rules followed by each Navy. Any deficiencies pointed out in the existing procedures in the Greek Navy are the result of the lack of the industrial base to accept such orders. Additionally this lack seems to be more subjective than objective. The structural concept in these industries

exists. Motivations necessary to exclude this lack will be described for the benefit of both the Navy and the shipbuilders.

B. DEFICIENCIES AND PROPOSALS

- Stages: There is no clear distinction between the various phases that constitute the construction of a major system. However, the sequence of the steps that are involved are well known. Expert officers having more knowledge and less experience have been involved from time to time in a variety of shipbuildings.
- Proposal: The implementation of exact and specific stages could be established. Each stage as it is indicated in relative figures should include detailed descriptions of the responsibilities, schedules and costs. Expected benefits are the detailed schedule of time required isolation of responsibilities, motivation for productivity and possible reward, and increased cooperation. From the manufacturer's point of view the impacts could be a reduction in cost, increased profit, and elimination of the variable overhead.
- Work Forces: At the present time the responsibility for the structure of the workers and employees rests upon the manufacturer. The Navy makes observations about the progress of the program. The commander of the mission makes reports to the GEN as described in section E, chapter VI.
- Proposal: A matrix organization should be established. Specific professions should cooperate. This fact would lead to a specific and detailed description of the advanced requirements involved in ship construction. Lack of personnel in a position could be completed by a similar team working in the same project. Wasted time

and increases in cost could be avoided, and a synergistic environment could be created.

- Planning Packages-Cost Reduction: This process is well defined whenever repairs are made by the Navy's employees. The existence of the specific work schedule carries the responsibility to follow-up this schedule. But the cost is not clearly defined and in some cases may exceed the budget for the required overhaul.
- Proposal: A work budget and schedule integration scheme can be established. The duties of this office are the definition of the work to be performed, the schedule of the activities and the particular jobs, and the allocation of the existing resources. The existence of a Cost Account Manager is a necessity, because in this way the small projects can be carried out effectively. That is why any ship-wide problems are based originally in these lower levels of the work. Expected benefit can be the description of both the schedule variance and the cost variance. The first one represents the difference between the budgeted cost of work performed and the budgeted cost of work scheduled. The second one is the result by subtracting the actual cost of work performed from the budgeted cost of work performed. It seems that considerations and major decisions based on the above variations could lead to a substantial reduction in expenditures.
- Industry: The Greek industry has to become more capable in order that major weapon systems may be acquired from these domestic organizations. At the present time, this capability exists only occasionally.
- Proposal: The government could establish criteria to attract investment capital to the domestic shipbuilding industry. It has to be noticed that the legislative decree 2687/1953 applies rules and methods for

investing and protecting the foreign capital. Recently, this decree has been strengthened by the article 107 of the country's Constitution of 1975 [Ref. 32].

a. Offset Benefits

The Greek Navy, and generally the Armed Forces, can establish the method of "offset benefits". That is the amount of economic and technological benefits that the offerer manufacturer may provide to the buyer as a counter-balance of the specific commission given to him. At the present time the industry needs the transfer of advanced technology from abroad. Anticipated benefits are: training, specifications, test instruments, special tools, and generally the know how. The expansion of this method to the defense field is thoroughly supported by many countries.

b. Co-production

The co-production, being a part of an offset program, implies that the party can be concurrently buyer and subcontractor. The country can construct parts of the main unit. In this way the anticipated benefit is the gradual exploration of technology base programs that also represent for further expansion of the industry's capability.

c. Negotiator

The Greek Navy's contracting department carries out its responsibility by evaluating the upcoming conditions based on the Navy's interests. The key player before the assignment of the contract, the negotiator, is led by his experience rather than by a scientific education [Ref. 34]. Tactics in this field are used by both the Navy and the manufacturer. The negotiators of the private sector are mostly professionals. It is in the Navy's interest to acquire the same professionals.

d. Warm Production Base

In some cases the production rate may be less than the required optimum one. But this inefficiency does not mean that the Navy invests "lost" money in these industries. It may be preferable for small quantities to be acquired from the industries rather than large quantities at a quick rate. The expected benefit is a warm production base.

e. Capital Incentives

Incentive and reward fees designed from the manufacturer's point of view appear to be an effective motivator. This incentive can lead the manufacturer to increase productivity, improve the quality of the system, and to reduce the duration of the whole program without altering the required capabilities of the ship under construction.

f. Small Companies

The protection of small companies could be a factor for exploiting their resources and for protecting all the companies. An office could be established to authorize the provision of weapon systems in companies with a limited number of employees. Similar conditions exist in U.S. Navy where the Small Business Office (NAVSEA OOK 5N18/3) authorizes the provision of weapon systems contracts to companies with less than 1000 employees.

g. Program Manager

Purposely the idea of the PM has been left as a final proposal. Many details have been included in this research about his duties and responsibilities. The author's perception is that instead of discussing this concept it would be preferable to mention the thoughts of R. McNamara

who summarized the PM's responsibilities by stating, "I want to look to a point of central control and information in the form of a program manager for each major weapon system. He shall be rewarded in his career for prompt and analytical disclosure of his problems as well as for his successes. This is a key position in our military departments, demanding the best managerial talents on which I want to place full reliance for our future weapons inventories" [Ref. 5].

APPENDIX A
LIST OF ABBREVIATIONS

A/GEN: Chief of General Staff of Navy
A/GEETHA: Chief of General Staff of National Defense
ARD: Armament Division
ASD: Assistant Secretary of Defense
ASD(C): Comptroller
ASD(H&E): Health and Education
ASD(I&L): Installations and Logistics
ASD(INT): Intelligence
ASD(ISA): International Security Affairs
ASD(LA): Legislative Affairs
ASD(PA): Public Affairs
ASN: Assistant Secretary of Navy
ASN(R&D): Research and Development
CAIG: Cost Acquisition Improvement Group
CMC: Commandant, Marine Corps
CNM: Chief, Naval Material
CNO: Chief of Naval Operations
CO: Contracting Officer
COCE: Committee of Cost Estimation
COMOPTEVFOR: Commander Operational T&E Force
DAE: Defense Acquisition Executive
DCP: Decision Coordinating Paper
DEM: Defense Minister
DEPSECDEF: Deputy Secretary of Defense
D(N)SARC: Dep. of Navy Systems Review Acq. Council
DOD: Department of Defense
DON: Department of Navy
DSARC: Defense Systems Acquisition Review Council
FPB: Fast Patrol Boat

GDP: Gross Domestic Product
GEA: General Staff of Air-Force
GEETHA: General Staff of National Defense
GEN: General Staff of Navy
GES: General Staff of Army
GNP: Gross National Product
ILS: Integrated Logistics Support
IM: Introductory Memorandum
IPS: Integrated Program Summary
JMSNS: Justification of Major Systems New Start
OJCS: Office of Joint Chiefs of Staff
KYSEA: Governmental Council of National Defense
LCC: Life Cycle Cost
MAT: Material
MENS: Mission Element Need Statement
MND: Mission Need Determination
NAVMAT: Chief of Naval Material
NAVSEA: Naval Sea Systems Command
ND: National Defense
OFFP: Office of Federal Procurement Policy
OMB: Office of Management and Budget
OPNAV: Office of Chief of Naval Operations
OSD: Office of Secretary of Defense
PDM: Program Decision Memorandum
P3I: Pre-Planned Product Improvement
PM: Program Manager
PCM: Program Objectives Memorandum
PPBS: Planning Programming and Budgeting System
PRESINSURV: President Inspection Survey
PROC: Procurement
PROD: Production
RDT&E: Research Development Test and Evaluation
R&D: Research and Development
SDDM: Secretary of Defense Decision Memorandum

SECDEF: Secretary of Defense
SECNAV: Secretary of Navy
SYSCOM: Systems Commander
T&E: Test and Evaluation
TEMP: Test and Evaluation Master Plan
USDR&E: Under SECDEF for Research and Engineering
VCNO: Vice Chief of Naval Operations
YETHA: Ministry of Defense
W.F.: Work Forces

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